om 5184516-100 Rev. 5

Revision 5

Precision 500D R&F System Operator Manual

CE 0459

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REV HISTORY

REV	DATE	REASON FOR CHANGE
1	September 21, 2006	Initial Release
2	May 16, 2007	Changed “power on” and “reset” instructions to indicate the buttons being located on the RCIM instead of the IUI. Updated model numbers in Table 7-1 an throughout document. Removed references to “hardcopy output” to match current system configuration. Changed labels on illustration of key switch on OTS console. Removed Table 11-1, information no longer applies.
3	August 17, 2007	Removed RCIM from Illustration 7-2 and Table 7-1; replaced with Operator Console. Added and updated part numbers in Table 7-1 rows 1, 4, and 6. Removed “X-Ray control” from row 8, JEDI Generator.
4	October 3, 2007	Updated Table 7-1, Items 6 and 8 to identify X-ray control unit depending upon date of manufacture. Added model numbers to Table 7-1 row 1(Overhead tube Collimator) and row 4 (Precision 500D R&F Table Collimator). Added note about radiopacity after table 7-12. Added ifnormation on collimator lamp replacement for model 5234954 in Chapter 8. Added mR/mAs calibration and maintanence frequency to table in Appendix B section 3-1.
5	November 26, 2007	Updated list of international keyboard options to show current supported languages of English and German. Added text of hardware label to Illustration 8-7.

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CHAPTER 1
ABOUT THIS GUIDE

SECTION 1
PURPOSE OF THIS GUIDE

This guide is written for health care professionals (namely, X–Ray technologists) to provide the necessary information relating to the proper operation of the system. The guide is intended to teach you the system components and features necessary to use it to its maximum potential. It is not intended to teach radiological imaging or to make any type of clinical diagnosis.

This guide should be kept with the equipment at all times. It is important for you to read and understand the contents of this guide before attempting to use this product. It is important for you to periodically review the procedures and safety precautions.

SECTION 2
PREREQUISITE SKILLS

This guide is not intended to teach radiological imaging. It is necessary for you to have sufficient knowledge to competently perform the various diagnostics imaging procedures within your modality. This knowledge is gained through a variety of education methods including clinical working experience, hospital based programs, and as part of many college and university Radiological Technology programs.

SECTION 3
SAFETY NOTICES

The following are used to emphasize certain safety instructions. This guide used the international symbol along with the danger, warning, or caution message. This section also describes the purpose of a Note.

DANGER IS USED TO IDENTIFY CONDITIONS OR ACTIONS FOR WHICH A SPECIFIC HAZARD IS KNOWN TO EXIST WHICH WILL CAUSE SEVERE PERSONAL INJURY, DEATH, OR SUBSTANTIAL PROPERTY DAMAGE IF THE INSTRUCTIONS ARE IGNORED.

WARNING IS USED TO IDENTIFY CONDITIONS OR ACTIONS FOR WHICH A SPECIFIC HAZARD IS KNOWN TO EXIST WHICH MAY CAUSE SEVERE PERSONAL INJURY, DEATH, OR SUBSTANTIAL PROPERTY DAMAGE IF THE INSTRUCTIONS ARE IGNORED.

Caution is used to identify conditions or actions for which a potential hazard may exist which will or can cause minor personal injury or property damage if the instructions are ignored.

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NOTE: A Note provides additional information that is helpful to you. It may emphasize certain information regarding special tools or techniques, items to check before proceeding, or factors to consider about a concept or task.

SECTION 4
DISPOSAL OF WASTE

This symbol indicates that the waste of electrical and electronic equipment must not be disposed as unsorted municipal waste and must be collected separately. Please contact an authorized representative of the manufacturer for information concerning the decommissioning of your equipment

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CHAPTER 2
SAFETY AND REGULATORY

SECTION 1
INTRODUCTION

This chapter explains the safety considerations, general equipment and patient related precautions, and the symbols used for the safe operation of your equipment. It is important for you to read and understand the contents of this chapter so you can follow the correct precautions.

This chapter also includes information about the emergency procedures. This guide should be kept near your console for easy access. Symbols used on this system and in its accompanying documents are explained in this chapter.

If you have any comments, suggestions or corrections to the information in this document, please write them down, include the document title and document number, and send them to:

GENERAL ELECTRIC COMPANY MEDICAL SYSTEMS
MANAGER – INFORMATION INTEGRATION,
AMERICAS W–622
P.O. BOX 414
MILWAUKEE, WI 53201–0414

INDICATIONS FOR USE

The Precision 500D R&F X–ray System is indicated for use in generating radiographic and fluoroscopic images of human anatomy in all general purpose X–ray diagnostic procedures.

SECTION 2
WHAT DO I NEED TO KNOW ABOUT . . .

This section provides information and precautionary measures to safely operate the system:

- Safety and Regulatory
- X–Ray Protection
  - Certified Electrical Contractor Statement
  - Damage in Transportation
  - Regulatory Requirements
- Safety
  - General Precautions
  - Establish Emergency Procedures
  - Approved Operating Procedures and Accessories
  - Planned Maintenance
  - Radiation Safety

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- Electrical Safety
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- Unsafe Table Region
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- Safety Harness
- Reciprocating Bucky
- Bucky Grids
- Patient Step
- Foot Rest
- Shoulder Rest
- Compression Device
- Myelographic Operation
- Myelographic Boots (Optional)
- Cone Operation
- Lead Apron
- Emergency Stop Button
- Grounding Kit

SECTION 3
X-RAY PROTECTION

X-ray equipment if not properly used may cause injury. Accordingly, the instructions herein contained should be thoroughly read and understood by everyone who will use the equipment before you attempt to place this equipment in operation. The General Electric Company, Medical Systems Group, will be glad to assist and cooperate in placing this equipment in use.

Although this apparatus incorporates a high degree of protection against x-radiation other than the useful beam, no practical design of equipment can provide complete protection. Nor can any practical design compel the operator to take adequate precautions to prevent the possibility of any persons carelessly exposing themselves or others to radiation.

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It is important that everyone having anything to do with x-radiation be properly trained and fully acquainted with the recommendations of the National Council on Radiation Protection and Measurements as published in NCRP Reports available from NCRP Publications, 7910 Woodmont Avenue, Room 1016, Bethesda, Maryland 20814, and of the International Commission on Radiation Protection, and take adequate steps to protect against injury.

The equipment is sold with the understanding that the General Electric Company, Medical Systems Group, its agents, and representatives have no responsibility for injury or damage which may result from improper use of the equipment.

Various protective material and devices are available. It is urged that such materials or devices be used.

United States Federal law restricts this device to use by or on the order of a physician.

3-1Certified Electrical Contractor Statement

All electrical installations that are preliminary to positioning of the equipment at the site prepared for the equipment shall be performed by licensed electrical contractors. In addition, electrical feeds into the Power Distribution Unit shall be performed by licensed electrical contractors. Other connections between pieces of electrical equipment, calibrations, and testing shall be performed by qualified GE Medical personnel. The products involved (and the accompanying electrical installations) are highly sophisticated, and special engineering competence is required. In performing all electrical work on these products, GE will use its own specially trained field engineers. All of GE's electrical work on these products will comply with the requirements of the applicable electrical codes.

The purchaser of GE equipment shall only utilize qualified personnel (i.e., GE's field engineers, personnel of third-party service companies with equivalent training, or licensed electricians) to perform electrical servicing on the equipment.

3-2Damage In Transportation

All packages should be closely examined at time of delivery. If damage is apparent, have notation "damage in shipment" written on all copies of the freight or express bill before delivery is accepted or "signed for" by a General Electric representative or a hospital receiving agent. Whether noted or concealed, damage MUST be reported to the carrier immediately upon discovery, or in any event, within 14 days after receipt, and the contents and containers held for inspection by the carrier. A transportation company will not pay a claim for damage if an inspection is not requested within this 14 day period.

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Call Traffic and Transportation, Milwaukee, WI (414) 827–3449 / 8*285–3449 **immediately** after damage is found. At this time be ready to supply name of carrier, delivery date, consignee name, freight or express bill number, item damaged and extent of damage.

Complete instructions regarding claim procedure are found in Section “S” of the Policy & Procedure Bulletins.

3-3Regulatory Requirements

This equipment generates, uses, and can radiate radio frequency energy. The equipment may cause radio frequency interference to other medical and non-medical devices and radio communications. To provide reasonable protection against such interference, this product complies with emissions limits for a Group 1 Class A Medical Devices as stated in EN 60601–1–2.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment is found to cause interference (which may be determined by switching the equipment on and off), the user (or qualified service personnel) should attempt to correct the problem by one or more of the following measure(s):

- Reorient or relocate the affected device(s).
- Increase the separating space between the equipment and the affected device.
- Power the equipment from a source different from that of the affected device.
- Consult the point of purchase or service representative for further suggestions.

The manufacturer is not responsible for any interference caused either by the use of interconnect cables other than those recommended, or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user’s authority to operate the equipment.

To comply with the regulations applicable to an electromagnetic interface for a

Group 1 Class A Medical Device, all interconnect cables to peripheral devices must be shielded and properly grounded. Use of cables not properly shielded and grounded may result in the equipment causing radio frequency interference in violation of the European Union Medical Device directive and FCC regulations.

NOTE: Do not use devices which intentionally transmit RF Signals (Cellular Phones, Transceivers, or Radio Controlled Products) in the vicinity of this equipment as it may cause performance outside the published specifications. Keep the power to these type devices turned off when near this equipment.

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The medical staff in charge of this equipment is required to instruct technicians, patients, and other people who may be around this equipment to fully comply with the above requirement.

High levels of Radio Frequency (RF) energy in the vicinity of this X–Ray Suite may cause noise to appear on video monitors and recorders. This noise should disappear spontaneously when the stimulus is removed. If the problem persists, call Service.

Under certain Electro Static Discharge (ESD) and Electrical Fast Transient (EFT) conditions, noise may appear on video monitors and recorders. This noise should disappear spontaneously when the stimulus is removed. If the problem persists, call Service.

Under certain conditions, ESD may cause temporary anomalies to be present on the image monitors and the VCR. This is a temporary degradation during the ESD event and does not cause any system issues.

Under certain conditions, transients on the power line may cause temporary anomalies to be present on the image monitors. This is a temporary degradation during the transient event and does not cause any system issues.

This product complies with the regulatory requirements of the following:

- Council Directive 93/42/EEC concerning medical devices when it bears the following CE marking of conformity:

CE 0459

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For a system, the location of the CE marking label is described in the system manual.

European registered place of business:

GE Medical Systems Europe
Quality Assurance Manager
BP 34F 78533 BUC CEDEX
France
Tel: +33 1 30 70 40 40

- Green QSD 1990 Standard issued by MDD (Medical Devices Directorate, Department of Health, UK).
- Medical Device Good Manufacturing Practice Manual issued by the FDA (Food and Drug Administration, Department of Health, USA).
- Underwriters' Laboratories, Inc. (UL), an independent testing laboratory.
- Canadian Standards Association (CSA).
- International Electrotechnical Commission (IEC). International standards organization, when applicable.

General Electric Medical Systems is ISO 9001 certified.

SECTION 4
RADIATION SURVEY

4-1Introduction

This report describes measurements of the distribution of stray radiation around the GE Precision 500D R & F unit. These measurements were made as specified in IEC 60601.

4-2Materials and Methods

The reference point for all measurements was chosen as the center of the tabletop with the table positioned horizontally, using its centering function. All measurements were made with a phantom consisting of a 25 cm cube of polymethyl methacrylate (PMMA) centered on the tabletop. The entrance surface of the image intensifier was set at a distance of 30 cm above the tabletop. The nominal field size was 22 cm. The x–ray tube voltage was at the maximum fluoroscopic value of 120 kVp and the x–ray tube current was 4.6 mA. This resulted in an entrance area kerma product of 900 RVcm/min. This was used to normalize all of the measured values of stray radiation.

The unit was placed in four typical configurations for the surveys. Two of the configurations had the tabletop horizontal and the x–ray beam vertical and centered to the table. In this position, measurements were made without and with the protective lead curtain attached to the image intensifier tower. In these configurations, the central ray of the x–ray beam corresponded to the vertical projection of the chosen reference point. A third configuration was with the table vertical and the x–ray beam horizontal. The focal spot of the x–ray beam in this case was 125 cm above the floor. The protective lead curtain was not attached to the image intensifier tower, but the footrest was fitted to the table in this configuration. The

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fourth configuration was with the table in the 20º Trendelenberg position. The lead curtain was also removed in this case.

Measurements of air kerma were made using a 500 ml ionization chamber connected to a Capintec electrometer. The chamber was mounted vertically on a tripod, centered at heights of 1.0 and 1.5 meters above the floor. The measurements were made throughout the exam room within 3 meters of the reference point on a grid using 50 cm spacing between measurements. Measurements were made as close as practical to the x–ray unit. In areas close to the x–ray unit where the stray radiation field changed rapidly, the spacing between measurements was reduced to 25 cm to further improve the accuracy of the isokerma maps.

4-3Results

Measured values of air kerma were normalized to 1 GyVcm as specified in the IEC standard and used to construct isokerma contours at values of 16, 8, 4, 2, 1, 0.5, 0.25, 0.12, 0.06, 0.03, and 0.02 mGy/GyVcm. An isokerma dose map is provided for each of the four configurations, in horizontal planes 1.0 and 1.5 meters above the floor.

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Table Horizontal with no Lead Curtain
Dose at 1 Meter above the Floor

Isodose curves are given in μGy/Gycm²

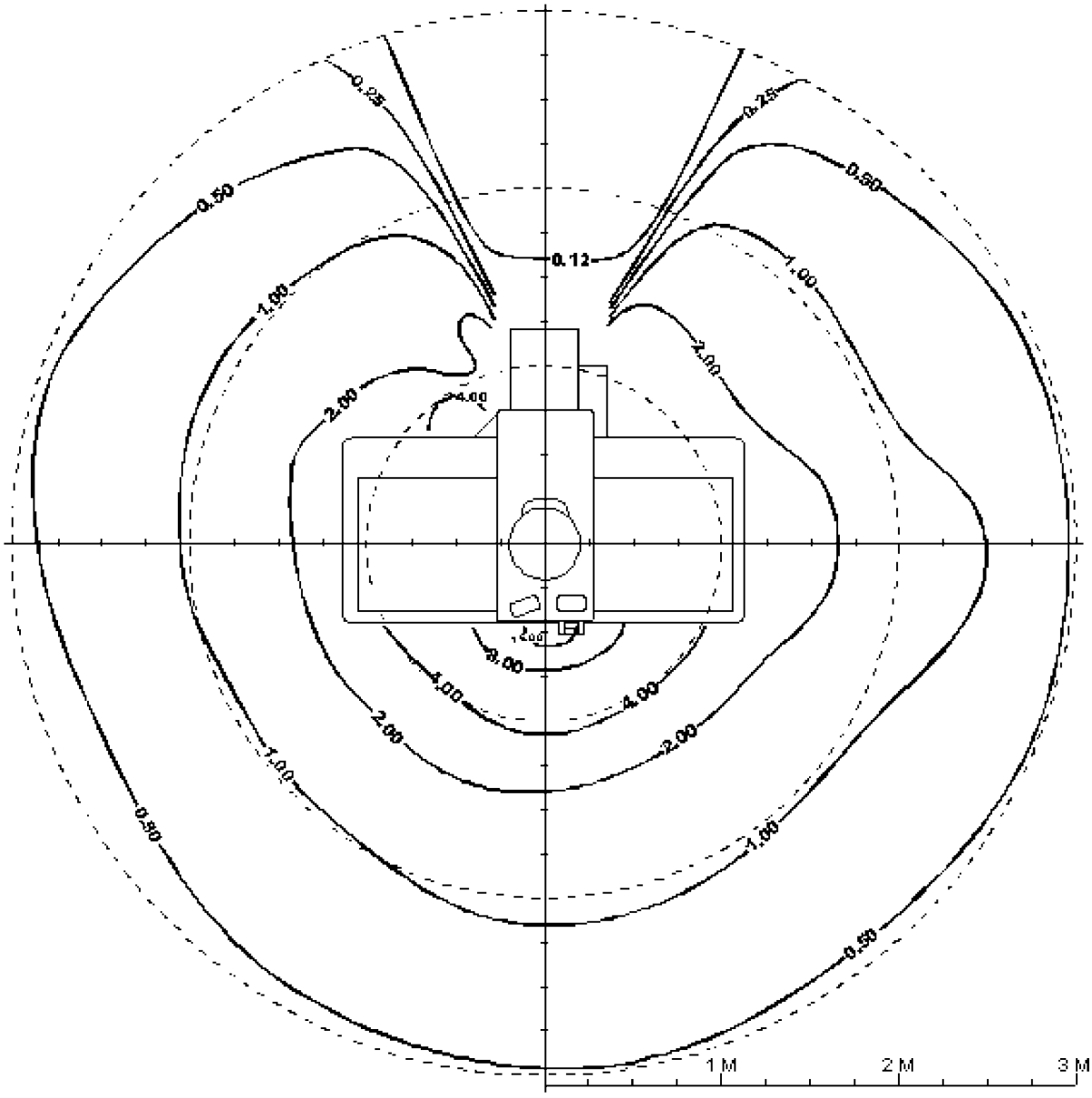

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Table Horizontal with no Lead Curtain
Dose at 1.5 Meters above the Floor

Isodose curves are given in μGy/Gycm²

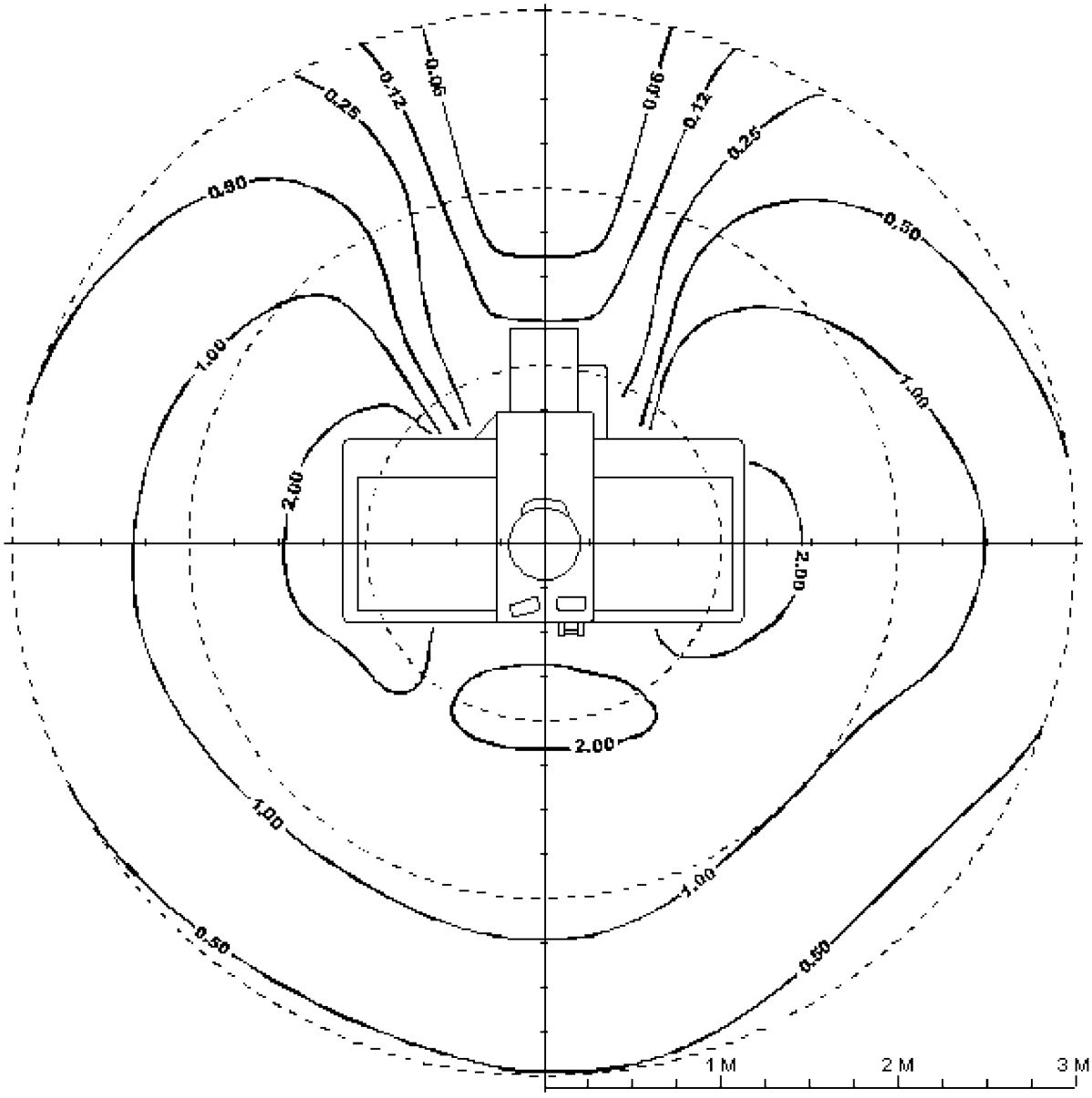

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Table Horizontal with the Lead Curtain in Place
Dose at 1 Meter above the Floor

Isodose curves are given in μGy/Gycm²

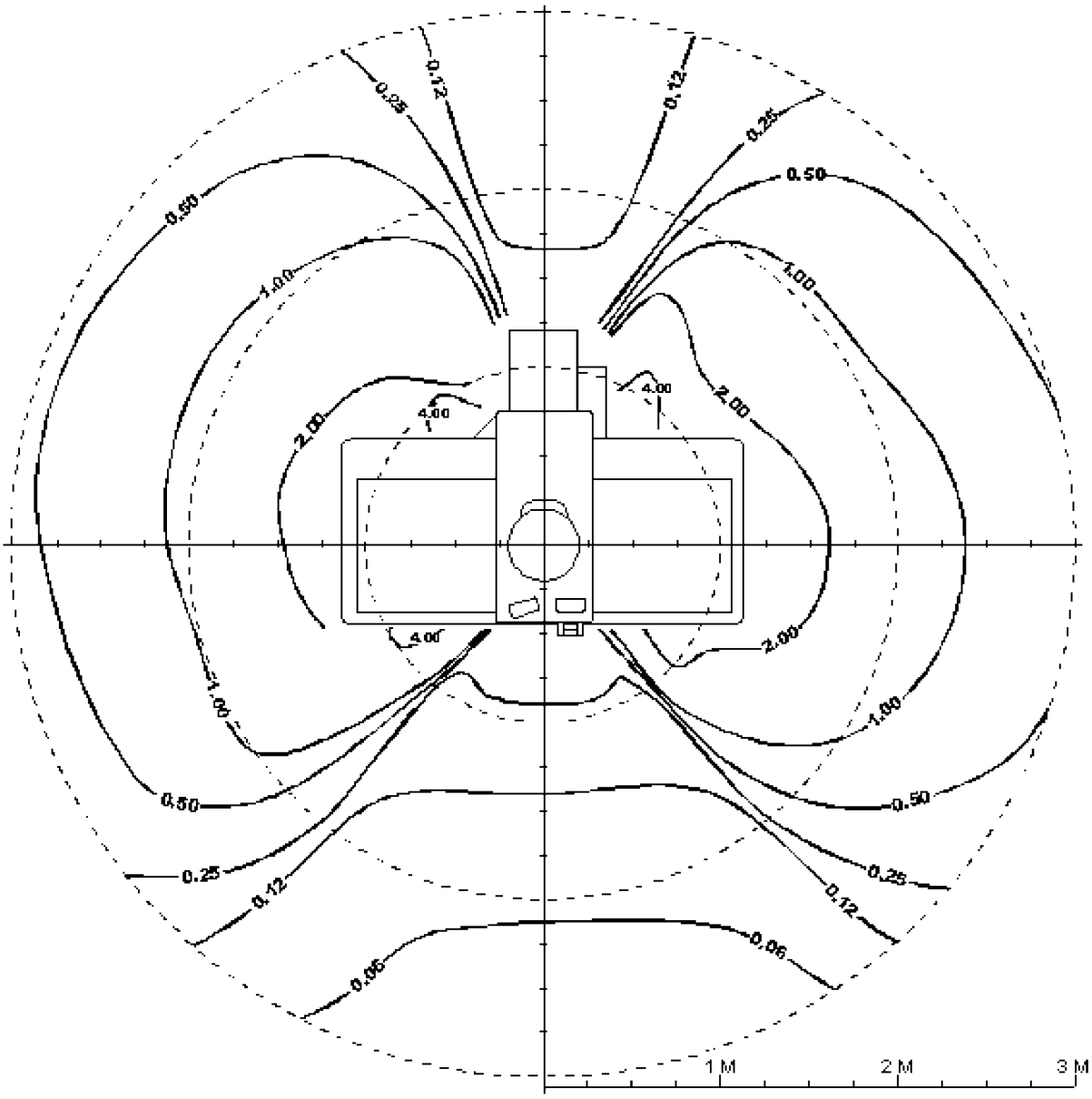

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Table Horizontal with Lead Curtain in Place
Dose at 1.5 Meters above the Floor

Isodose curves are given in μGy/Gycm²

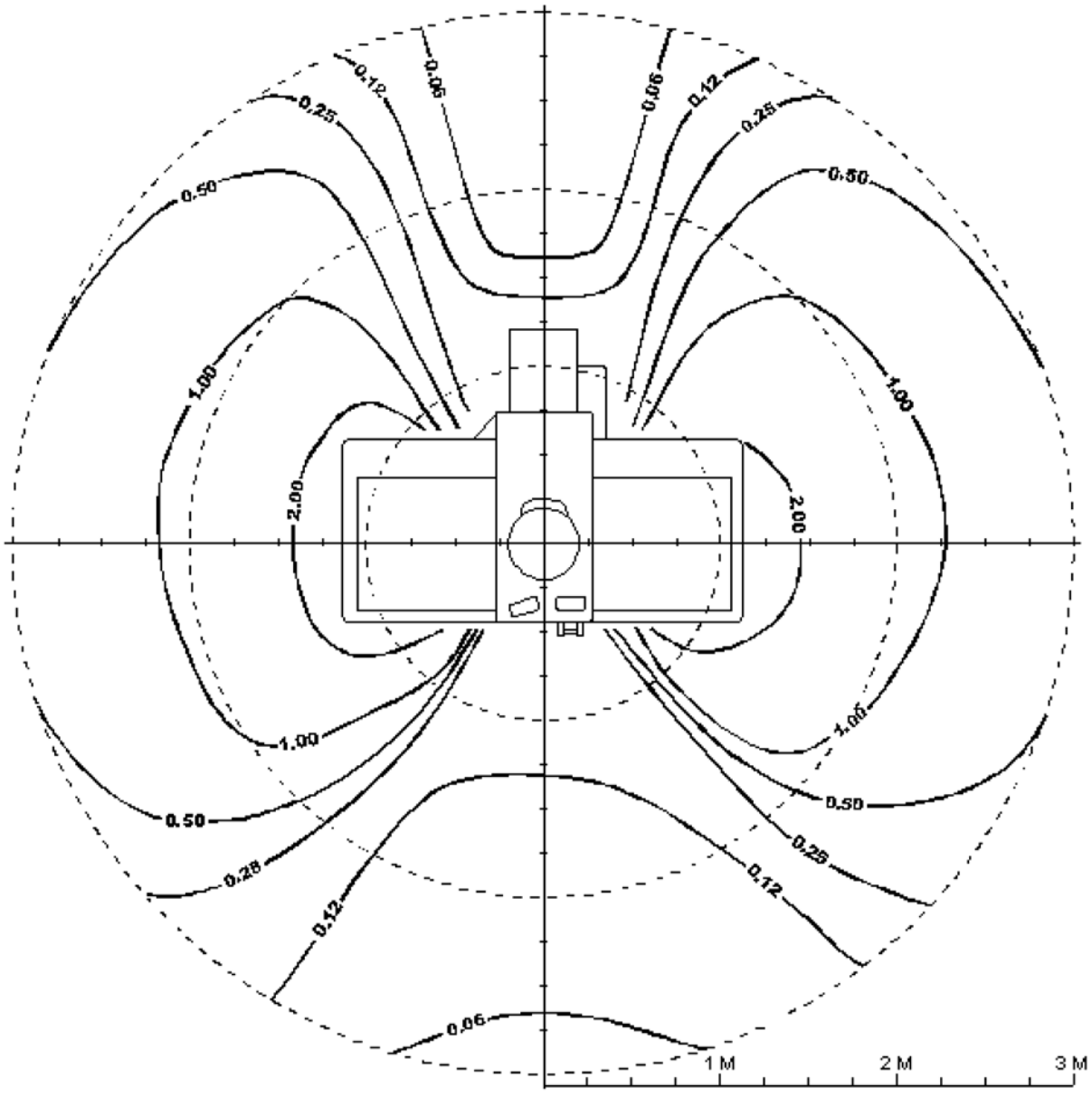

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Table Vertical without the Lead Curtain
Dose at 1 Meter above the Floor

Isodose curves are given in μGy/Gycm²

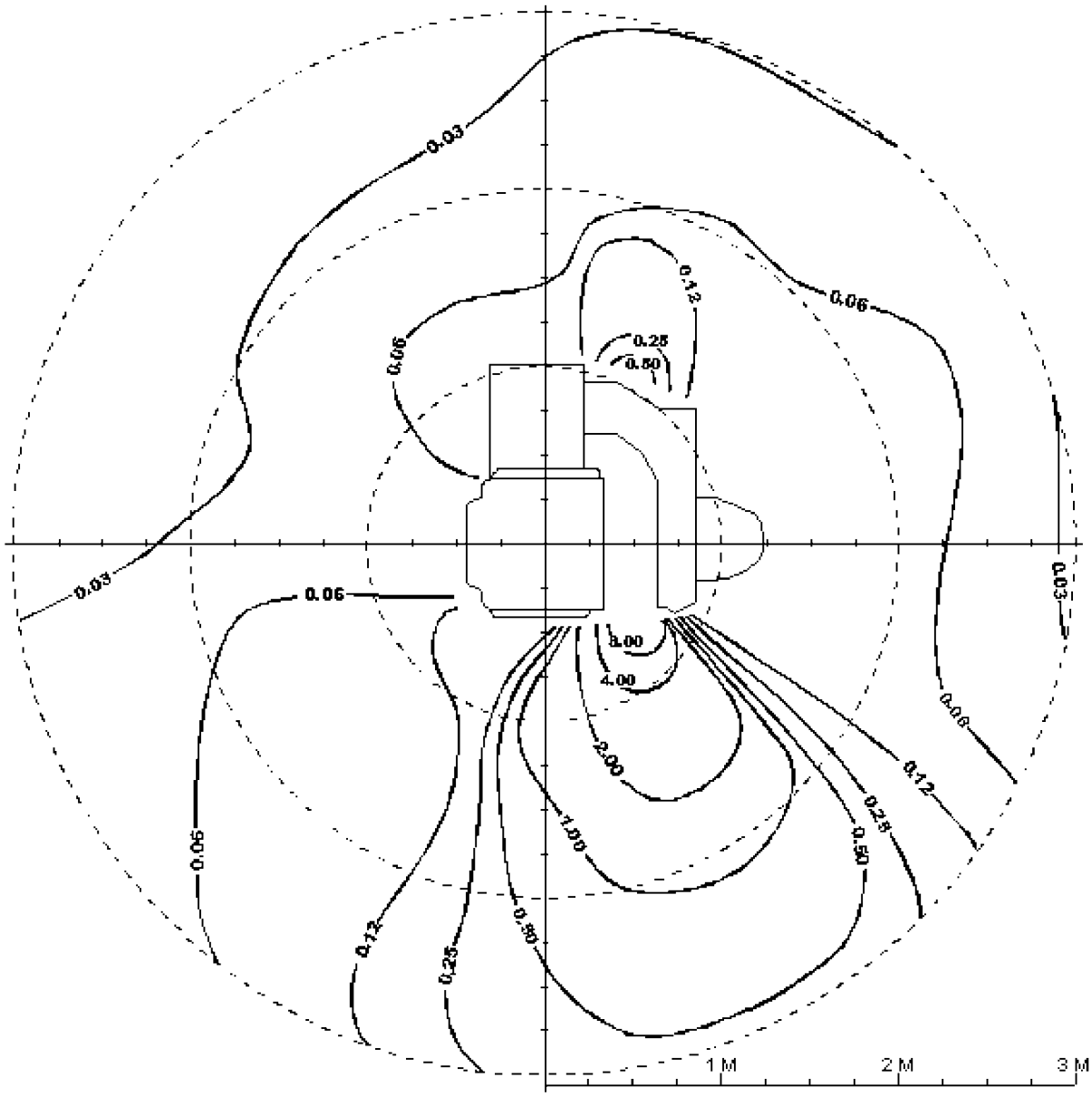

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Table Vertical without the Lead Curtain
Dose at 1 Meter above the Floor

Isodose curves are given in μGy/Gycm²

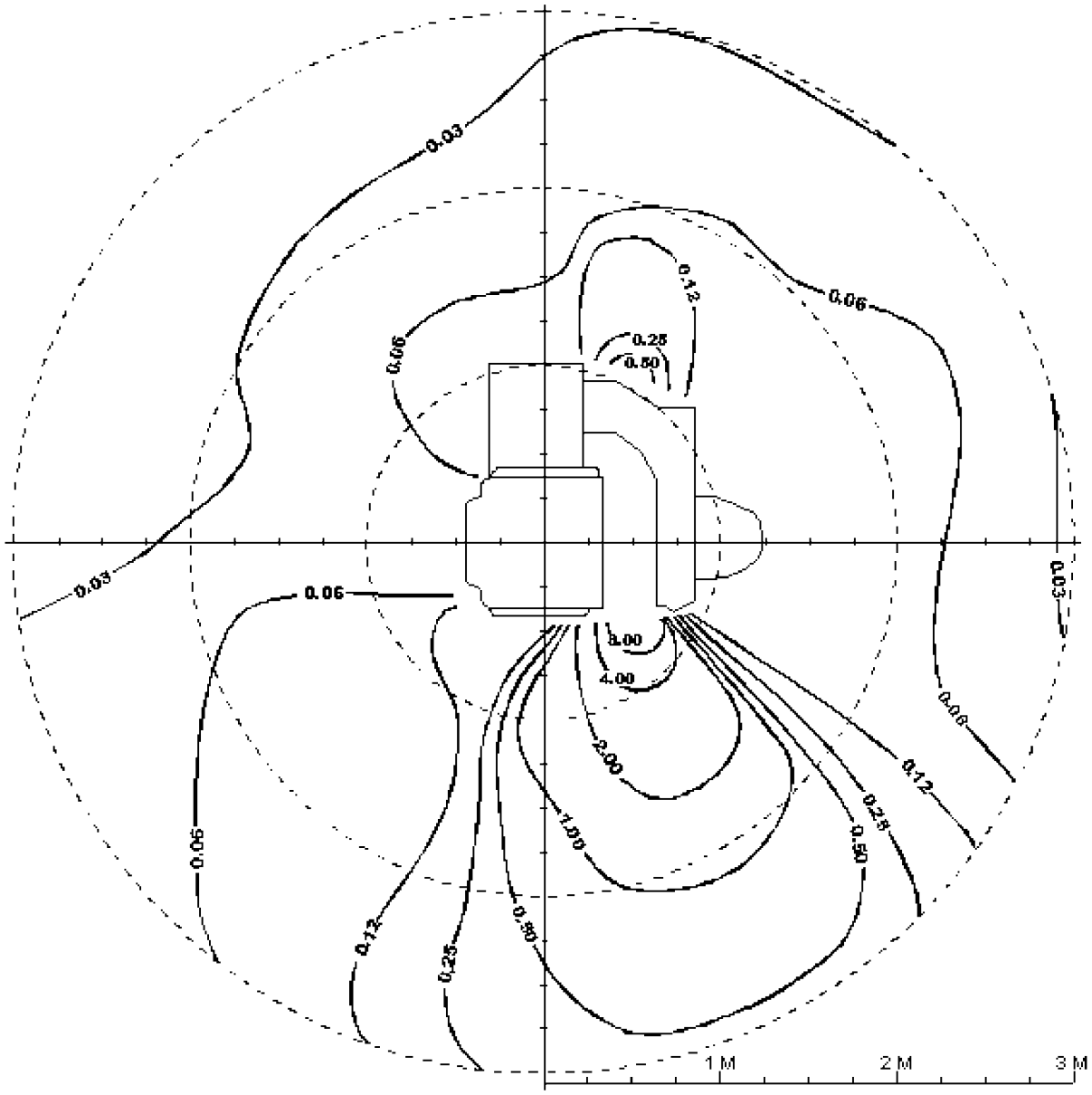

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Table at 20 degrees Trendelenberg with no Lead Curtain
Dose at 1 Meter above the Floor

Isodose curves are given in µGy/Gycm²

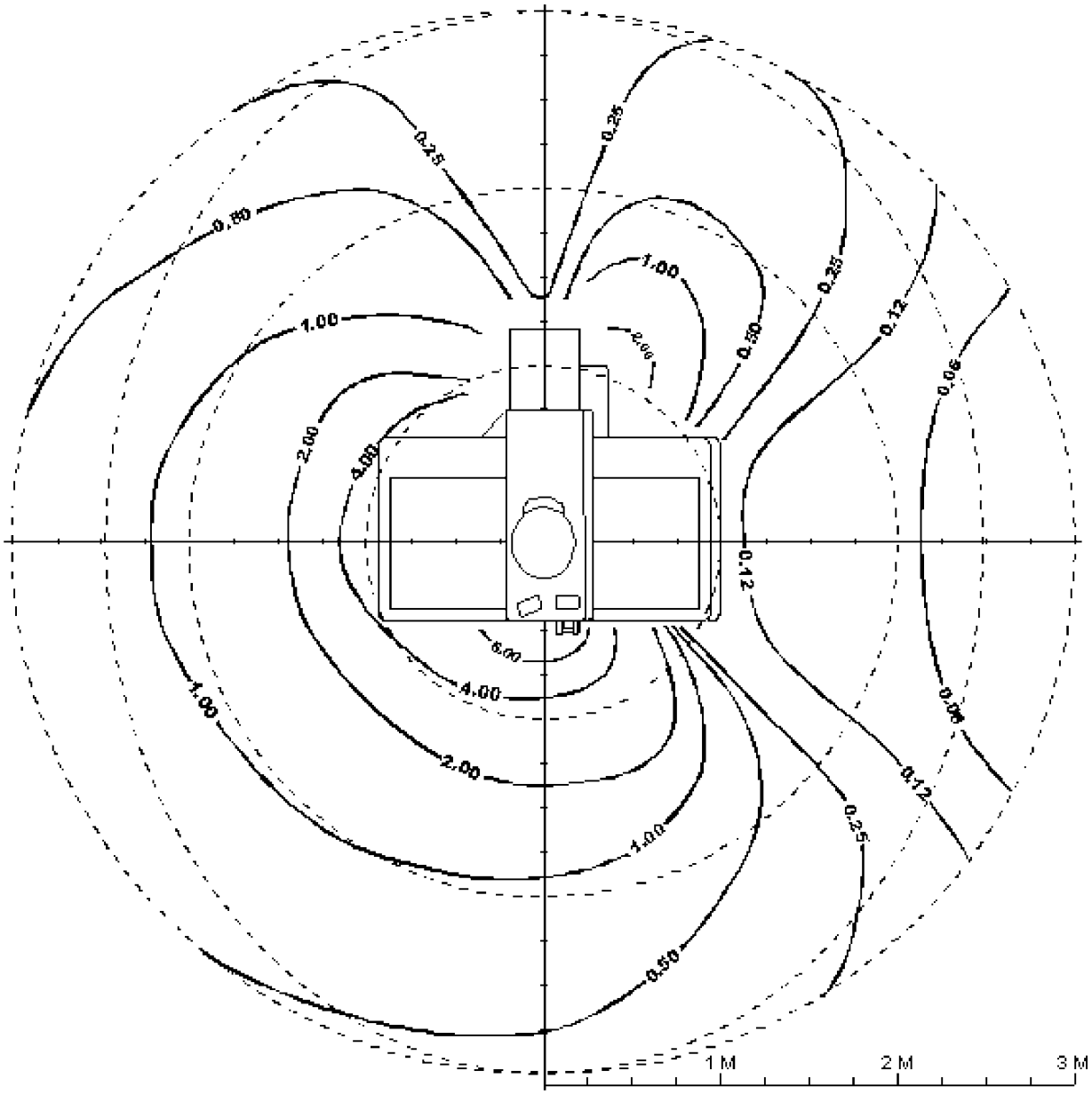

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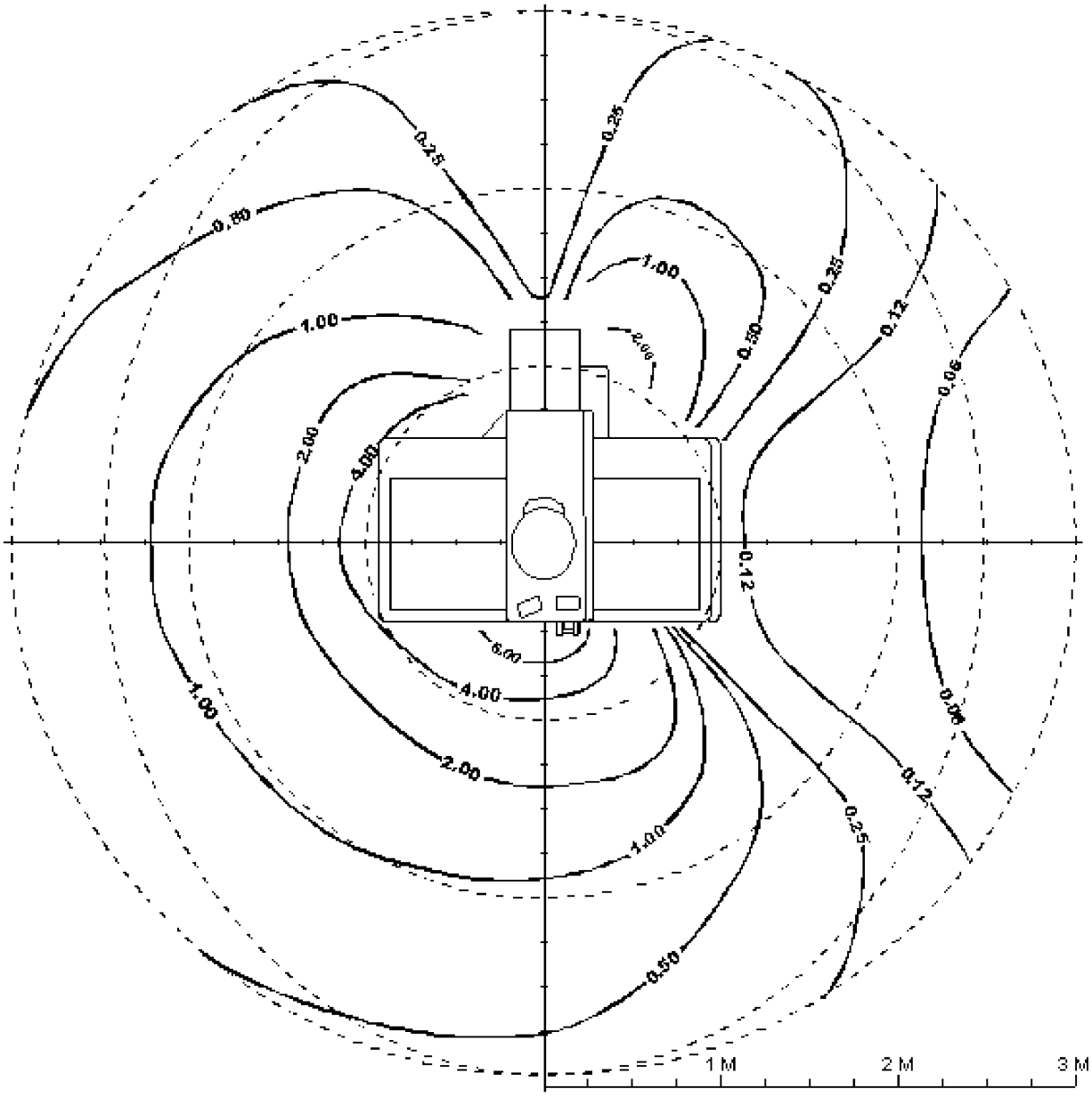
Table at 20 degrees Trendelenberg with no Lead Curtain
Dose at 1 Meter above the Floor

Isodose curves are given in µGy/Gycm²



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SECTION 5
SAFETY

5-1General Precautions

Be alert to safety when operating this equipment. Be familiar enough with the equipment to recognize any malfunctions that can be a hazard. Do not use this equipment, if a malfunction occurs, until qualified service personnel correct the problem.

Use proper technique factors for each procedure to minimize x-ray exposure and to produce the best diagnostic results. Be thoroughly familiar with the following list of safety precautions before operating this equipment.

Make sure there is means for audio and visual communication between the operator in the control booth and the patient on the x–ray table.

Make sure to use focal spot to skin distances as large as possible in order to keep the absorbed dose to the patient as low as reasonably achievable.

THIS X-RAY UNIT MAY BE DANGEROUS TO PATIENT AND OPERATOR, UNLESS SAFE EXPOSURE FACTORS, OPERATING INSTRUCTIONS AND MAINTENANCE SCHEDULES ARE OBSERVED.

TO BE USED BY AUTHORIZED PERSONNEL ONLY.

ELECTRIC SHOCK HAZARD! DO NOT REMOVE COVERS OR PANELS. CONSOLE AND CABINETS CONTAIN HIGH VOLTAGE CIRCUITS FOR GENERATING AND CONTROLLING X–RAYS. PREVENT POSSIBLE ELECTRIC SHOCK BY LEAVING COVERS OR PANELS ON THE EQUIPMENT. THERE ARE NO OPERATOR SERVICEABLE PARTS OR ADJUSTMENTS INSIDE THE CABINETS. ONLY TRAINED AND QUALIFIED PERSONNEL SHOULD BE PERMITTED ACCESS TO THE INTERNAL PARTS OF THIS EQUIPMENT.

The Control Console must be kept as vertical as possible to prevent over heating which could damage the console. Do not lay the console flat. Do not lay any object on the console that could restrict air flow through the console.

Do not lay any object on the cabinets that would restrict air flow from the top of the cabinet.

This system contains operating safeguards to provide maximum safety. Before calling for service, be certain proper operating procedures are being used.

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FOR TRAINING PURPOSES ONLY!

Satisfactory equipment performance requires the use of service personnel specially trained on x–ray apparatus. GE Medical Systems is responsible for the effects on safety, reliability, and performance only if the following conditions are met:

- The electrical wiring of the relevant rooms complies with the Regulations for the electrical equipment of buildings published by the Institution of Electrical Engineers as well as all national and local codes.
- All assembly operations, extensions, re–adjustments, modifications or repairs are carried out by GE Medical Systems' authorized service representatives.
- The equipment is used in accordance with the instructions for use.

Always be alert to safety when you operate this equipment. You must be familiar enough with the equipment to recognize any malfunctions that can be a hazard. If a malfunction occurs or a safety problem is known to exist, do not use this equipment until qualified personnel correct the problem.

Establish Emergency Procedures

It is not always possible to determine when some components, such as x–ray tubes, are nearing the end of their operating lives. These components could stop operating during a patient examination. **Establish procedures for handling the patient in case of the loss of fluoroscopic imaging or other system functions during an exam.**

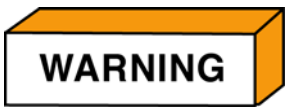
ESTABLISH PROCEDURES FOR HANDLING THE PATIENT IN CASE OF THE LOSS OF FLUOROSCOPIC IMAGING OR OTHER SYSTEM FUNCTIONS DURING AN EXAM.

FOR CONTINUED SAFE USE OF THIS EQUIPMENT, FOLLOW THE INSTRUCTIONS CONTAINED IN THIS OPERATING MANUAL. STUDY THIS MANUAL CAREFULLY BEFORE USING THE EQUIPMENT AND KEEP IT AT HAND FOR QUICK REFERENCE.

RADIOGRAPHIC EQUIPMENT MUST BE OPERATED BY QUALIFIED PERSONNEL AND ONLY AFTER SUFFICIENT TRAINING.

UNITED STATES FEDERAL LAW RESTRICTS THIS DEVICE TO USE BY OR ON THE ORDER OF A PHYSICIAN.

PERFORM PERIODIC MAINTENANCE TO ENSURE CONTINUED SAFE USE OF THE EQUIPMENT. (SEE Appendix B – Planned Maintenance).



IF ANY SAFETY PROBLEM OCCURS, PLEASE STOP USING THIS DEVICE AND CONTACT OUR SERVICE AT ONCE.

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CAUTION

Always be alert to safety when you operate this equipment. You must be familiar enough with the equipment to recognize any malfunctions that can be a hazard. If a malfunction occurs or a safety problem is known to exist, do not use this equipment until qualified personnel correct the problem.

WARNING

IT IS THE RESPONSIBILITY OF THE OPERATOR TO ENSURE THE SAFETY OF THE PATIENT WHILE THE MACHINE IS IN OPERATION BY CHECKING PROPER PATIENT POSITIONING AND USING THE EQUIPMENT PROTECTIVE DEVICES SUCH AS HAND GRIPS AND SAFETY HARNESSES.

WARNING

DANGER

WHEN MOVING THE TABLE TOP, BUCKY OR OTHER ELEMENTS, BE SURE THE PATIENT'S HEAD (HAIR), HANDS AND FEET ARE COMPLETELY ON AND WITHIN THE TABLE TOP PROPER. ENSURE OXYGEN AND IV TUBING STAYS CLEAR FROM MOVING COMPONENTS OF THE SYSTEM. IF PATIENT'S HANDS GRIP AROUND THE TABLE TOP FRAME, OR IF ANY PART OF HIS BODY HANGS OVER ANY EDGE OR END OF THE TABLE, SERIOUS INJURY MAY RESULT. USE THE PATIENT GRASP HANDLES, THE SAFETY HARNESS, THE SHOULDER REST, THE FOOT REST AND OTHER SAFETY MEASURES, AS APPROPRIATE, TO PREVENT ACCIDENTS.

IT IS THE RESPONSIBILITY OF THE OPERATOR TO PROVIDE MEANS FOR AUDIO AND VISUAL COMMUNICATION WITH THE PATIENT FROM THE CONTROL ROOM.

PATIENT INJURY MAY OCCUR. ALWAYS ASSIST THE PATIENT ON OR OFF THE TABLE AT THE BEGINNING OR END OF AN EXAM.

RISK OF EXPLOSION IF USED IN THE PRESENCE OF FLAMMABLE ANESTHETICS

WARNING

POSSIBLE PATIENT INJURY!

TO AVOID POSSIBLE PATIENT INJURY BE SURE THAT SYSTEM POWER IS APPLIED BEFORE THE PATIENT ENTERS THE ROOM. THE OVER HEAD CEILING SUSPENSION LOCKS FUNCTION ONLY WHEN SYSTEM AC POWER IS APPLIED.

IF POWER IS DISCONNECTED, THE OVERHEAD SUSPENSION WILL MOVE FREELY, POSSIBLY HITTING THE PATIENT.

- **DO NOT ALLOW THE PATIENT TO USE THE OVERHEAD SUSPENSION AS A SUPPORT.**

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OPERATIONAL CHECKS

Be sure the equipment is functioning properly and safely before each examination:

Verify that the following controls are operating correctly:

- Motion Controls, and Lock Releases.
- Audible and visual alarms.

Visually inspect the equipment and make sure that:

- Equipment is not damaged or missing parts.
- All cover panels are in place prior to turning on electrical power (hazardous electrical or mechanical parts could be exposed.

APPROVED OPERATING PROCEDURES AND ACCESSORIES

Be sure to use the equipment and the equipment and the approved accessories according to approved operating procedures:

- Perform X–ray tube warm up procedures prior to the exam. Failure to perform this procedure could damage the X–ray tube assembly.
- Do not exceed tabletop rating of a 136 kg (300 lbs.) patient. Excessive loading could damage the tabletop and/or cause the patient to fall.
- Accessories should be properly attached to the table and positioned so as not to interfere with system motions.
- Avoid unnecessary exposure to radiation. Stay behind the lead glass radiation shield or lead screen. When in unshielded areas, wear protective apparel such as goggles, lead aprons, and gloves.

PLANNED MAINTENANCE

POSSIBLE PATIENT OR OPERATOR INJURY!

TO AVOID POSSIBLE PATIENT OR OPERATOR INJURY, BE SURE TO PERFORM PERIODIC INSPECTIONS AND MAINTENANCE PROVIDED IN THIS DOCUMENT. FAILURE TO PERFORM THESE INSPECTIONS COULD ALLOW DETERIORATING CONDITIONS TO DEVELOP WITHOUT BEING DETECTED. THIS DETERIORATION COULD RESULT IN EQUIPMENT FAILURES WHICH COULD CAUSE SERIOUS INJURY AND EQUIPMENT DAMAGE.

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RADIATION SAFETY

Always use proper technique factors for each procedure to minimize x–ray exposure and to produce the best diagnostic results. In particular, you must be thoroughly familiar with safety precautions before operating the system.

It is not always possible to determine when some components, such as x–ray tubes, are nearing the end of their operating lives. These components could stop operating during a patient examination.

Use radiation protection when using this equipment. Gonadal shielding and lead aprons are essential to provide radiation protection for the patient and the operator.

WHEN THE SPOT FILM DEVICE TOWER IS POSITIONED AS FAR TOWARDS THE BACK OF THE TABLE AS POSSIBLE AND THE TABLE TOP IS POSITIONED AS FAR TOWARDS THE FRONT OF THE TABLE AS POSSIBLE, A PORTION OF THE METAL FRAMEWORK OF THE TABLE WILL BE VISIBLE IN THE IMAGE. A PORTION OF THE X–RAY IMAGE WILL BE CUT OFF WITH THE SPOT FILM DEVICE TOWER AND THE TABLE TOP IN THESE EXTREME AND OPPOSING POSITIONS.

KNOW THE EQUIPMENT

Read and understand all the instructions in the operating manuals before attempting to use the product and request training assistance from GE Medical System if needed. Keep operating manuals with the equipment at all times and periodically review the procedures and safety precautions.

This system contains operating safeguards to provide maximum safety. Before calling for service, be certain proper operating procedures are being used.

Satisfactory equipment performance requires the use of service personnel specially trained on x–ray apparatus. GE Medical Systems is responsible for the effects on safety, reliability, and performance only if the following conditions are met:

- The electrical wiring of the relevant rooms complies with all national and local codes as well as the Regulations for the Electrical Equipment of Buildings published by the Institution of Electrical Engineers.
- All assembly operations, extensions, re–adjustments, modifications or repairs are carried out by GE Medical Systems' authorized service representatives.

5-2Electrical Safety

If the table is to be used for special procedure applications, a grounding kit is required and can be factory installed with original order.

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5-3Patient Positioning and Control

PATIENT INJURY MAY OCCUR. ALWAYS ASSIST THE PATIENT ON OR OFF THE TABLE AT THE BEGINNING OR END OF AN EXAM.

WHEN MOVING THE TABLE TOP, BUCKY OR OTHER ELEMENTS, BE SURE THE PATIENT'S HEAD (HAIR), HANDS AND FEET ARE COMPLETELY ON AND WITHIN THE TABLE TOP PROPER. ENSURE OXYGEN AND IV TUBING STAYS CLEAR FROM MOVING COMPONENTS OF THE SYSTEM. IF PATIENT'S HANDS GRIP AROUND THE TABLE TOP FRAME, OR IF ANY PART OF HIS BODY HANGS OVER ANY EDGE OR END OF THE TABLE, SERIOUS INJURY MAY RESULT. USE THE PATIENT GRASP HANDLES, THE SAFETY HARNESS, THE SHOULDER REST, THE FOOT REST AND OTHER SAFETY MEASURES, AS APPROPRIATE, TO PREVENT ACCIDENTS.

In addition, before moving the table, table–top, Intelligent Digital Device, Bucky, OTS or other elements, be sure that the surrounding areas are clear of any obstruction.

Periodic inspection, prompt adjustment, repair or replacement of all elements of this equipment is recommended. If in doubt about the condition of this equipment, consult a GE Medical Systems technician.

5-4Table Angulation

Before angulating the table verify the area beneath and above the table is clear of obstruction. Selection of table positioning controls may result in patient injury or equipment damage.

PERSONAL INJURY IS POSSIBLE IN THE EVENT OF UNINTENDED TABLE ANGULATION. DO NOT LEAVE PATIENT UNATTENDED ON THE TABLE.

5-5Unsafe Table Region

Use care to avoid patient or operator injury, or equipment damage, in the event that an actual equipment failure caused the table to remain in an unsafe region.

If a table enters into, or powers up in an unsafe region, only those controls that can return the table to a safe region are allowed. To move out of an unsafe region:

1. Center the table top. If full table motion is not available, then
2. Move the table into the horizontal position. If full table motion is still not available.
3. Remove patient from table, safely, and call GE Service.

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CAUTION

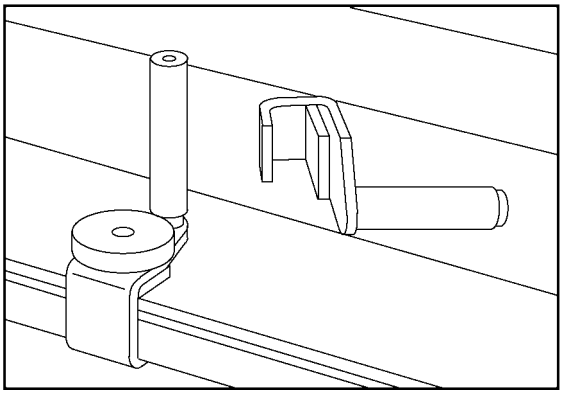
Injury could occur from unintended motion. Remove patient from the table and call Service.

5-6Patient Grasp Handles

The Patient Grasp handles may be engaged anywhere along the table top frame. Place the clamp fully onto the top frame and tighten the knob firmly.

Instruct patients to use them. They are intended to keep the patient's hands out of harm's way, **but are not intended to hold the weight of the patient.**

ILLUSTRATION 2-1
GRASP HANDLES



5-7Safety Harness

Make certain to have at least a 3 inch (76 mm) overlap of the self–adhering material of the safety harness. This amount of overlap is required to support the weight of a 300 lb (136 kg) patient.

WARNING

PATIENT MAY FALL OR ROLL OFF TABLE. USE SAFETY HARNESS WHENEVER POSSIBLE. NEVER LEAVE THE PATIENT UNATTENDED.

5-8Reciprocating Bucky

WARNING

THE BUCKY ASSEMBLY IS UNBALANCED WHENEVER THE CASSETTE TRAY IS REMOVED WHILE THE TABLE IS IN THE VERTICAL OR TRENDELENBURG POSITION. TO AVOID SUDDEN MOVEMENT WHICH COULD CAUSE INJURY, ONLY REMOVE THE CASSETTE TRAY WHILE BUCKY ASSEMBLY IS LOCKED AND THE TABLE IS IN THE HORIZONTAL POSITION.

FOR TRAINING PURPOSES ONLY!
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5-8-1 Travel and Counterbalancing

The Bucky is counterbalanced with a 14, x 17, film cassette. Loading a smaller cassette into the tray, or removing the cassette will unbalance the Bucky when the table is not horizontal. To prevent the Bucky from falling, position and lock the Bucky before inserting the cassette if the table is not horizontal.

To hold the Bucky in place, apply the lock on the right side.

- To release the lock, pull the knob out and turn it 1/4 turn.
- To apply it, turn the knob and allow it to retract.

Approximate Bucky travel limits are:

- With lateral shift top – 40 inches (1016 mm) of longitudinal travel.

When not in use, park and lock the Bucky at the extreme foot end of the table.

5-9Bucky Grids

Grid choice is made at the time the equipment is ordered. Changing grids is not a normal user operation. Call GE Service to perform this service.

5-9-1 Oscillating Grid

The Bucky grid oscillates during the X–ray exposure. X-ray exposures are prevented until the grid is in motion.

5-9-2 Single High Line/Rate Grid

A 12:1 or 8:1 high line/rate stationary grid is available. The single high line/rate grid does not oscillate.

5-9-3 Bucky Grid Alignment

Centering

Density cutoff at the edges of the film and the appearance of grid patterns indicate inaccurate lateral alignment.

Lateral overhead tube alignment becomes critical as grid ratio increases. Therefore, lateral stereo work using a grid is not recommended.

Longitudinal alignment is not critical and tilted tube technics may be used. It is important that the x–ray field coincide with the film. Align the collimator projected light coincident with the Bucky handle index mark.

Focal Range

The Source to Image Distance (SID) must be consistent with the grid focal range for linear focused grids. This becomes more critical at high grid ratios.

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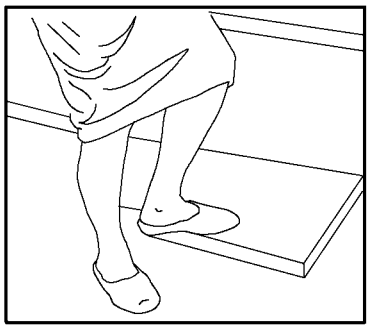
5-10Patient Step

The patient step (ILLUSTRATION 2-2) provides patient convenience getting on and off the table. The step is attached to the underside of the table body to the right of the front support. Table angulation is prevented when the step is pulled out. The white button must be pressed to push the step in.

WARNING

INJURY COULD OCCUR IF PATIENT STEP IS NOT FULLY OUT. VERIFY PATIENT STEP IS FULLY ENGAGED AND ASSIST THE PATIENT ON AND OFF THE TABLE.

ILLUSTRATION 2-2
PATIENT STEP



5-11Foot Rest

WARNING

TO PREVENT IMPROPER ATTACHMENT AND POTENTIAL INJURY TO PATIENT, USE THIS FOOTREST ONLY ON THE TABLE FOR WHICH IT HAS BEEN ADJUSTED.

NOTICE

Installing the foot rest at the set of slots closest to the end of the tabletop provides easier patient boarding.

The foot rest is engaged on the table top in the same manner as shown for the shoulder rest on ILLUSTRATION 2-3, and is designed to support a 300 lb (136 kg) patient.

To attach:

1. Push on the safety latches with the thumbs and spread the handles.
2. Place the foot rest on the top adjacent to a set of slots and release the handles.
3. Slide the foot rest until both handles snap into place.

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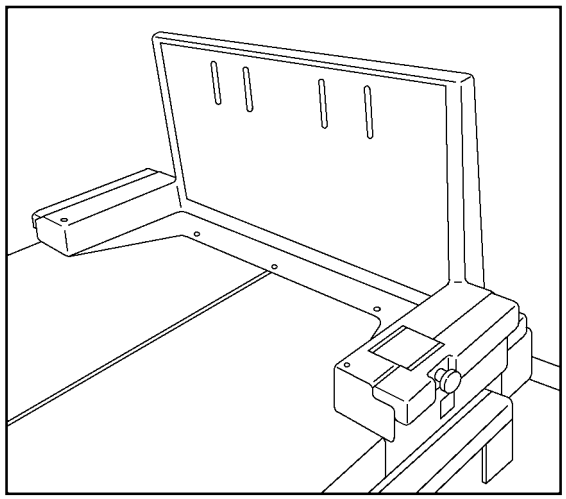
The safety latches will reset to prevent accidental spreading of the handles.

Check that BOTH handles have positive engagement by pulling on the foot rest. In case of any difficulties or doubts about the foot rest condition, call a qualified technician.

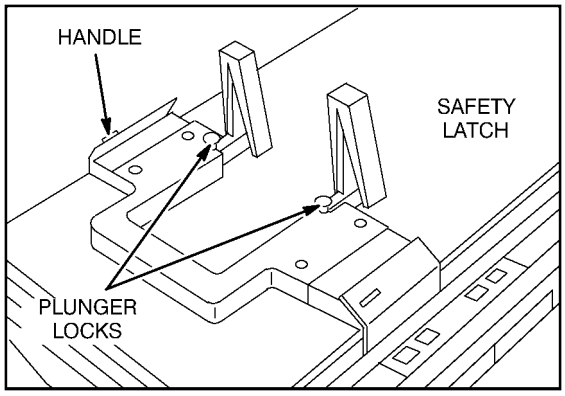
ILLUSTRATION 2-3
FOOT REST



5-12Shoulder Rest

The shoulder rest (ILLUSTRATION 2-4) is engaged on the table top in the same manner as the foot rest. The plunger locks permit adjustment of the pad position in 1/2” increments.

ILLUSTRATION 2-4
SHOULDER REST



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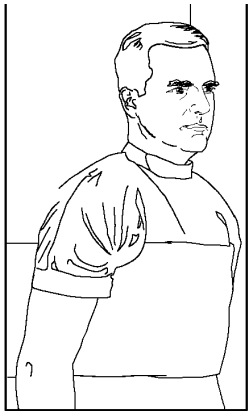
5-13Compression Device

The compression device is not intended to be used for patient support or restraint. It may be engaged at any point along the table top and consists of the front bracket with ratchet, roller and band, and the rear anchor bracket. To use:

1. Position the patient
2. Engage the brackets on the front and rear edges of the table top.
3. Pull up the ratchet handle, pull out the band and hook the rod on the rear bracket.
4. Tighten the band by “cranking” the ratchet handle i.e., move it back and forth.
5. Release the patient by lifting up the ratchet handle and disengaging the band.

ILLUSTRATION 2-5
COMPRESSION DEVICE



5-14Myelographic Operation

For myelographic procedures, the Horizontal Stop selection located on the table control panel should be off. This inhibits accidental motion of the cone during the procedure.

SET THE MANUAL MYELOGRAPHIC STOP ON THE FLUORO CARRIAGE (ILLUSTRATION 2-6) BEFORE BEGINNING THE PROCEDURE.

To set the myelographic stop:

1. Press the button, move stop up or down and release it.
2. Then move the spot film device against it to make sure it is firmly seated.

NOTE: Engage the compression lock on the IDD as a precaution.

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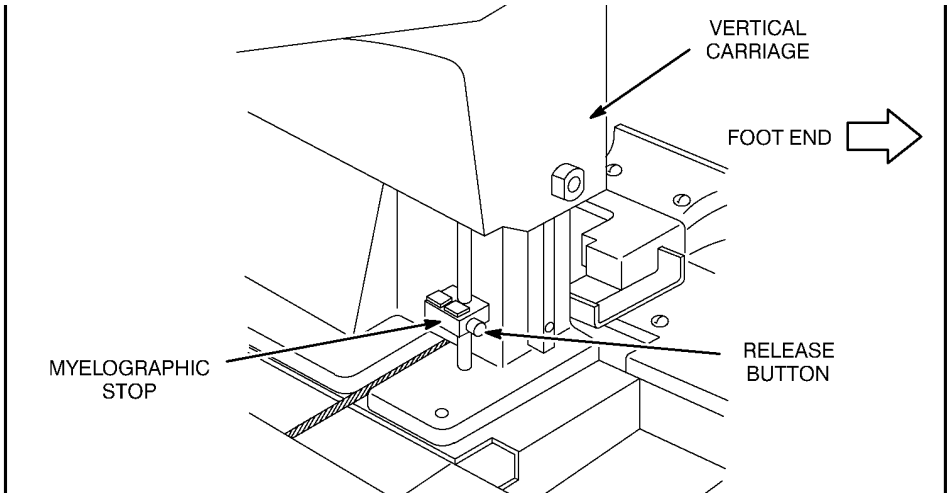
ILLUSTRATION 2-6
MYELOGRAPHIC STOP



5-15Myelographic Boots (Optional)

These boots are intended for patient's support during myelography and are attached to slots in the standard foot rest. When using these boots, mount the shoulder rest to the table for added safety assurance. THE SHOULDER REST NEED NOT BE IN ACTUAL CONTACT WITH THE PATIENT.

5-16Cone Operation

The cone drive is inoperable when the table HORIZONTAL STOP is OFF.

CAUTION

Ensure that spot film device is not on top of patient when bringing cone in and out of Field of View.

5-17Lead Apron

1. Move the apron handle to position the lead apron. Position the handle between the two lines for horizontal work. Outside the rear line it will slide, as the table is angulated, in position for vertical work. Refer to ILLUSTRATION 2-7.

2. To remove the Lead Apron.

   a. Pull out release button, and pull handle handle down.

   b. Slide apron out of track towards rear of spot film device.

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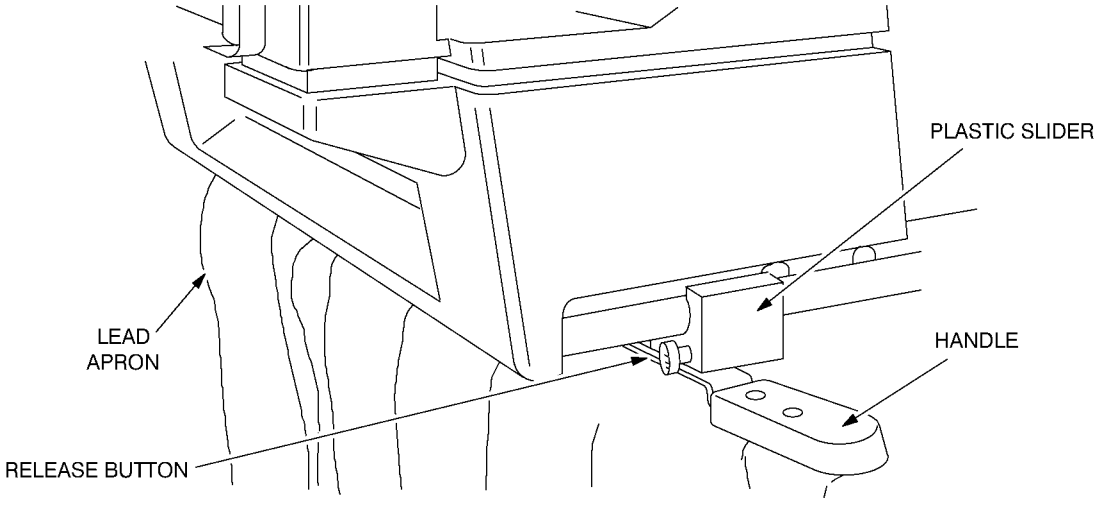
WARNING

THE LEAD APRON PROTECTS THE OPERATOR FROM ANY SCATTER RADIATION. IT SHOULD REMAIN ATTACHED TO THE IMAGING DEVICE AT ALL TIMES.

THIS LEAD APRON MUST BE INSTALLED IN ORDER TO MEET THE RADIATION PROTECTION REQUIREMENTS OF IEC 601–1–3. THIS LEAD APRON IS PART OF THE PRIMARY PROTECTIVE SHIELDING OF THE EQUIPMENT USED TO ATTENUATE THE RESIDUAL RADIATION FOR THE PROTECTION OF THE OPERATOR AND STAFF.

3. To Engage Lead Apron:
   a. Engage sliders, at top of apron assembly, into track (on bottom of spot film device) at head end of table.
   b. Move handle pin under plastic slider hole.
   c. Insert handle pin up into plastic slider hole (snaps in place).
4. The lead equivalent of the lead apron is 0.5 millimeters.

ILLUSTRATION 2-7
LEAD APRON



5-18Emergency Stop Button

See ILLUSTRATION 2-8.

In the event of unintended table angulation, or any other unintended motion, press the “Emergency Stop Button”. This will instantly cut power to the table.

To restore power:

- Verify table is safe to angulate or move.
- Push, turn, and release the “Emergency Stop Button”.

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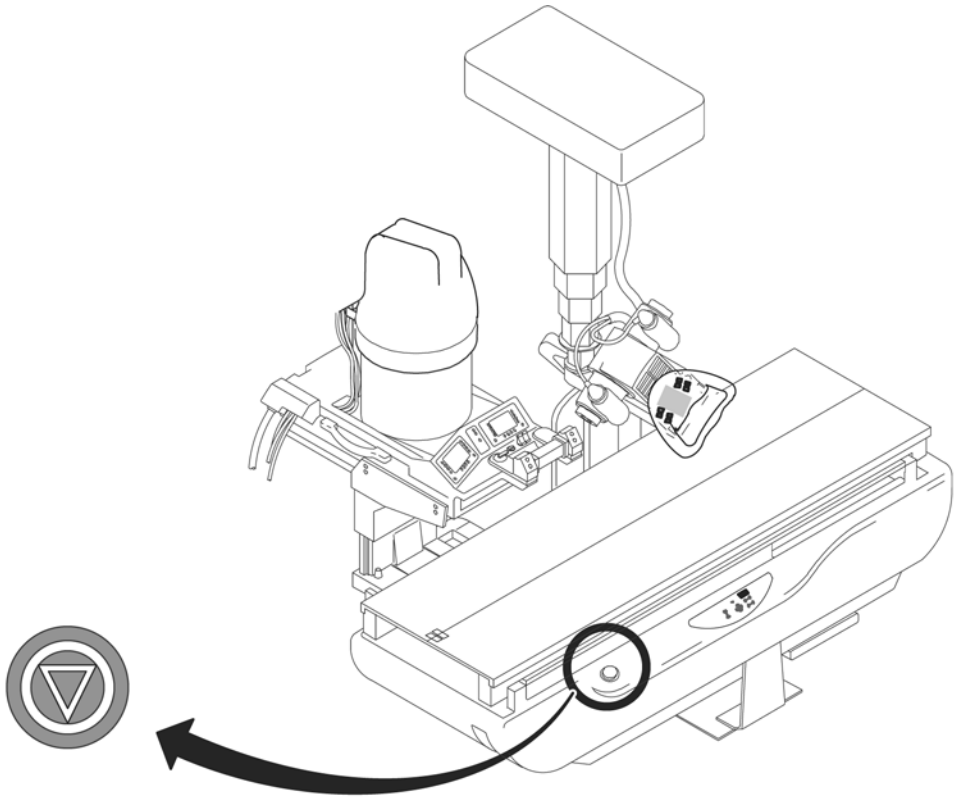
ILLUSTRATION 2-8
EMERGENCY STOP BUTTON



WARNING

IT IS EXTREMELY IMPORTANT TO CHECK THE OPERATION OF THIS BUTTON BEFORE EACH USE. THE PATIENT MUST NOT BE ADMITTED UNLESS THIS SAFETY FEATURE IS OPERATIONAL.

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5-19Grounding Kit

5-19-1 Purpose

A grounding kit provides special equipment grounding for the Expedio 500D Table and the Intelligent Digital Device during procedures where the patient may become susceptible to electrical shock. When installed, voltage differences due to leakage current between various parts of the table and other properly grounded equipment are minimized. The kit limits voltage differences should an electrical fault occur.

Patient vicinity grounding is required for procedures such as cardiac catheterization, in which the patient is electrically susceptible.

For patient grounding to be effective, it is imperative to properly ground all equipment which may come in contact with the patient, or anyone touching the patient during a procedure.

5-19-2 Description

The grounding outlet panel is located on the Precision 500D table base. This panel has connections for grounding the Precision 500D table top and other equipment such as a film changer and injector. The panel has four green grounding receptacles that accept grounding cord locking plugs.

Three grounding cables are supplied: one for the grounding table top, and two for the grounding accessories.

The table top grounding cable has locking pin plugs at both ends. This cable connects between one of the table base grounding receptacles and one of the table top grounding receptacles.

The accessory grounding cables are terminated with a locking pin plug at one end and a ground lug at the other end. These cables connect accessory equipment to the table base receptacles.

5-19-3 Instructions

To minimize the possibility of table top cable interference with patient, personnel, or equipment, carefully consider:

1. **Direction and distance that table top will be extended**
2. **Placement of personnel**
3. **Placement of equipment for the intended procedure**

Check all the table motions required for the procedure, with all ground cords, equipment, and personnel in place BEFORE bringing a patient into an examination room.

To connect a locking pin grounding cable to a ground receptacle, press the plug into the receptacle and rotate the plug slightly clockwise. The plug will remain engaged in the receptacle if properly connected.

To remove locking pins, push the plug in slightly and rotate counterclockwise until the plug is disengaged. A spring will push the plug out of the receptacle.

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NOTE: Remove the table top ground cord for procedures in which the patient is not electrically susceptible, especially for procedures that require table angulation. Cord removal reduces the chance of damage to equipment from entanglement with the cord.

Section 6
Safety Summary

The operator must read this manual in its entirety and receive training in system operation and application prior to operating the system.

DO NOT operate this unit if there is any uncertainty as to the proper functioning of the system. Refer all servicing to QUALIFIED SERVICE PERSONNEL.

The system has been designed and tested to meet FDA regulations. The following precautions and procedures must be complied with during all phases of operation of this instrument, failure to comply could result in injury and/or death to the operator or the patient. GE Medical Systems assumes no liability for the customer's failure to comply.

NOTE: GE Medical Systems suggests that an image quality and system function check be performed daily, prior to patient data acquisition. This can be done by acquiring images using a phantom, retrieving them, and then deleting the file per the operating instructions in this manual.

The system should not be operated such that a patient could come in contact with any part of the system.

FEDERAL LAW RESTRICTS THIS DEVICE TO SALE BY OR ON THE ORDER OF A PHYSICIAN.

THIS INSTRUMENT MUST BE GROUNDED! A THREE–CONDUCTOR AC POWER CABLE IS SUPPLIED WITH THIS INSTRUMENT TO PROVIDE THE PROPER ELECTRICAL GROUND. TO MINIMIZE THE SHOCK HAZARD, THE MAIN POWER CABLE OF THE ISOLATION TRANSFORMER MUST BE PLUGGED INTO A UL APPROVED THREE CONTACT ELECTRICAL OUTLET; AND ALL AUXILIARY COMPONENTS (EXCLUDING MONITORS) MUST BE PLUGGED INTO THE ISOLATION TRANSFORMER UNIT SUPPLIED WITH THE SYSTEM. (PART #735–045–G1 FOR 115V, PART #735–045–G2 FOR 230V, PART #735–045–G3 FOR 100V). DO NOT SIMPLY PLUG THE GOLDONE SYSTEM INTO A WALL PLUG!

DO NOT POSITION OR USE THIS SYSTEM IN A LOCATION WHERE IT MAY BE SUBJECT TO SPLASHED OR SPILLED LIQUIDS!

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WARNING

DO NOT USE THIS INSTRUMENT IN THE PRESENCE OF AN EXPLOSIVE ATMOSPHERE, INCLUDING FLAMMABLE ANESTHETICS. FAILURE TO COMPLY COULD RESULT IN FIRE AND EXPLOSION.

WARNING

DO NOT USE THIS INSTRUMENT IN THE PRESENCE OF AN EXPLOSIVE ATMOSPHERE, INCLUDING FLAMMABLE ANESTHETICS. FAILURE TO COMPLY COULD RESULT IN FIRE AND EXPLOSION.

WARNING

HIGH VOLTAGES CAPABLE OF CAUSING DEATH ARE PRESENT WITHIN THIS INSTRUMENT. REFER ALL SERVICING TO QUALIFIED SERVICE PERSONNEL ONLY.

WARNING

THE SYSTEM IS INTERFACED TO X–RAY GENERATING EQUIPMENT! BE CERTAIN TO FOLLOW THE X–RAY GENERATOR INSTRUCTIONS AND SPECIFICATION FOR WEARING PROPER LEAD SHIELDING WHEN IN THE PRESENCE OF X–RAY GENERATING EQUIPMENT. DO NOT ATTEMPT ANY MAINTENANCE OF THIS UNIT, INCLUDING TROUBLESHOOTING, IN THE PRESENCE OF ANY PATIENTS OR NON–AUTHORIZED STAFF.

CAUTION

There are no operator–serviceable parts within the system. Operators should not attempt to remove any panels or replace any parts. Refer all servicing to qualified service personnel only.

CAUTION

Dosimeters must be worn by all personnel during all phases of installation, operation and maintenance of the system and the equipment to which it is interfaced.

CAUTION

Do not attempt to alter any system software. Doing so could disrupt the functioning of the instrument and result in loss of images. Use of any software not provided by GE Medical Systems is strictly prohibited!

CAUTION

Do not attempt to alter any hardware unless the procedure is given in the Preventive/Corrective manual, or supplied with a part provided by GE Medical Systems. Doing so could disrupt the functioning of the system and result in loss of images.

CAUTION

Under certain conditions, ESD may cause temporary anomalies to be present on the image monitors and the VCR. This is a temporary degradation during the ESD event and does not cause any system issues.

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Under certain conditions, transients on the power line may cause temporary anomalies to be present on the image monitors. This is a temporary degradation during the transient event and does not cause any system issues.

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CHAPTER 3
ABOUT THE P500D

SECTION 1
INTRODUCTION

The Precision 500D is a high resolution, PC–based, digital imaging system designed for Digital Videofluorography (DVF). It is designed to replace conventional fluoroscopic photospot film techniques.

The system allows you to view 1024 x 1024 matrix images upon acquisition on a high resolution Image Monitor. Computerized window, level, inversion, edge enhancement, subtraction, and magnification features enable you to bring–up to diagnostic details difficult or impossible to see using conventional fluoroscopic techniques.

For example, spot film techniques are designed to produce high contrast images when filming barium and related contrast agents sacrificing the ability to visualize well the surrounding soft tissues. Through image processing the Precision 500D provides a “wider dynamic range” enabling you to enhance a particular area of interest and choose the optimum visualization of a given pathology.

The system provides the ability to print images to traditional film output devices. You can print images using whatever formats are supported by your multi–format camera or laser film recorder.

The system also allows you to archive images using a variety of devices including: DICOM 3.0 compatible network devices and MOD Recorders/Players.

NOTE: If you have any questions as to the operation of the system, contact your service agency.

SECTION 2
ENVIRONMENTAL REQUIREMENTS

TABLE 3-1
ENVIRONMENTAL REQUIREMENTS

	Temperature	Humidity	Atmospheric Pressure
Operation	50° – 90° F 10° – 32° C	30% – 75% noncond.	700 – 1060 hPA
Transport & Storage	–40° – 158° F –40° – 70° C	10% – 100% cond.	500 – 1060 hPA

SECTION 3
IMAGE STORAGE CAPACITY

The system is capable of holding a combination of several types of images including: Spot, Fluoro, and Subtracted Spot images in a file.

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Spot (subtracted and non–subtracted), fluoro and Digital Stepping images are acquired and stored in RAM (Random Access Memory). As the RAM memory fills the images are stored to the system's hard disk. The relative space available for storing images is shown on the Image Monitor during all operating modes.

An optional feature allows the last acquired Fluoro image of a fluoro sequence to be stored automatically to the system's hard disk.

The size of the PC Hard Drive determines the amount of image storage capacity available. The system may be upgraded to accommodate additional image storage. Single images can also be saved to a CD for easy transport.

SECTION 4
OPTIONS

4-1DICOM 3.0 Interface Option

Both processed and unprocessed images can be transferred to/from an external device via an Ethernet network link in a format that conforms to the ACR–NEMA DICOM 3.0 standard. Several features are associated with Image Transfer including applied enhancement processing or raw image data, Auto Transfer to DICOM device, Annotations included in Image Transfer, Patient Data included with Image Transfer, and DICOM WorkList Query/Import.

Patient files including just patient data, or patient data with images, can be imported to the system using DICOM transfer or DICOM WorkList queries.

THIS OPTIONAL FEATURE MUST BE ENABLED BY A TRAINED SERVICE ENGINEER. DO NOT ATTEMPT TO LOAD NETWORK ADDRESSES ONTO THE SYSTEM WITHOUT THE DICOM OPTIONAL SOFTWARE PACKAGE. TO DO SO WILL VOID THE PRODUCT WARRANTY.

4-2Bar Code Scanner Option

The digital system can now interface with a Bar code scanner to allow for more efficient and accurate entry of alphanumeric data that would otherwise have been entered via the keyboard.

During Review mode, the bar code scanner provides direct access to patient files for review and update.

During DICOM Worklist mode, using the bar code scanner makes loading manual queries easier.

4-3International Keyboard Option

The digital system supports English and German language keyboard styles.

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All aspects of text entry are supported for these above–mentioned language keyboards, including:

Patient Data (entry and editing)
Annotations
Series Titles
Site Names
Programmable Fields

The native language text will appear on the Image Display Monitor, Static Reference Monitors displays, Scan Converter Displays, and printed images.

NOTE:

This option requires modification to the digital system Parameters settings. The keyboard must be installed by trained Service personnel. DONOT plug in any Keyboard unless it is supplied or approved by GE Medical Systems.

DICOM Images: Sending or Archiving images using the DICOM protocol will include the native language text; however, importing patient files using the DICOM protocol is only guaranteed where the host and digital system use the same native language keyboard.

SECTION 5
POWER UP/POWER DOWN

POWER UP

1. Turn ON the power for the system. The Power On button is located on the RCIM; it is the button next to the Emergency Stop. See “Radiology Control Interface Module (RCIM)” on page 5.

POWER DOWN

1. End all sessions and log–out using the Shut Down command found in Utilities Tab. The system will automatically power down.

DO NOT simply turn off the system power while the PC is operational! As with any PC, loss of data may result if the proper power–down procedure is not performed.

DO NOT attempt to power down the system if images are currently being sent to a DICOM device.

SECTION 6
OVERVIEW

The physical operation of the original x–ray generator control devices will remain the same as they did prior to the installation.

The graphical user interface system is based on a series of menus shown on the Image Monitor. Operator input is made using a PC style keyboard, a mouse, and if installed, the optional Table–Side Remote Keypad, or Bar–code Scanner.

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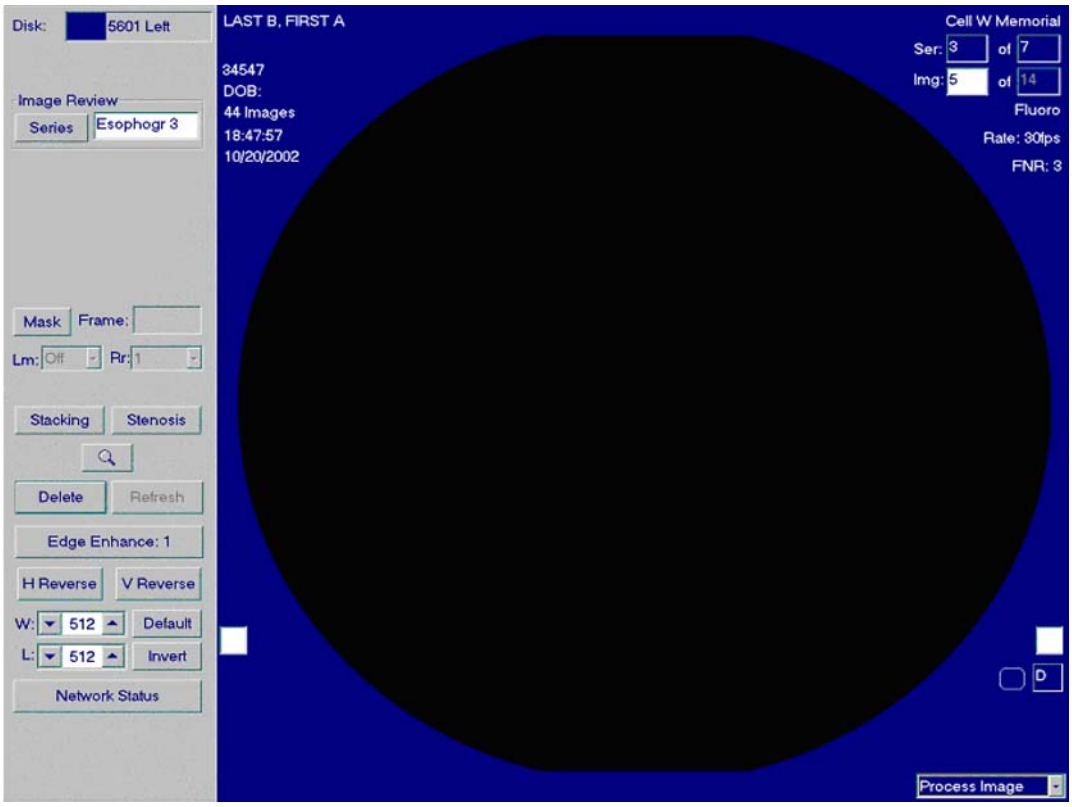
Several features are controlled via the Image Monitor. Each Monitor screen is divided into two areas: the left side is dedicated to image selection and features controls, and the right side shows the image display and a few feature controls (see ILLUSTRATION 3-1).

- Sometimes menus are shown over the image portion of the screen. The system operation is designed such that these menus do not usually interfere with the normal image viewing.

ILLUSTRATION 3-1**I**
ACQUIRE GENERAL SCREEN



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6-1Keyboard

The PC style keyboard is necessary for some modes of operation of the system.

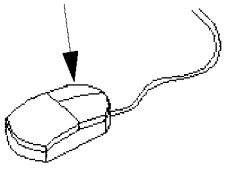
- The alphanumeric keys are used to enter patient and doctor information, enter run sequence titles, and annotation messages.

Each system includes a Keyboard as a standard component. The main Keyboard is normally located in the control room.

6-2Mouse

The Mouse controls the movement of the cursor as displayed on the Image Monitor.

Mouse Function: Click the left, or right button.
Move the mouse on a mouse pad to control the direction of the cursor.



- Unless mentioned specifically in the instructions, all clicks refer to the left mouse button.

6-3Radiology Control Interface Module (RCIM)

The Radiology Console Interface Module (RCIM) (ILLUSTRATION 3-2) controls the power and reset functions for the system. The RCIM has the power on button, reset button, an emergency stop button, and indicator lights. These functions are described in Table 4 on page 6.

The RCIM is placed at the workstation between the monitors and the keyboard.

ILLUSTRATION 3-2**RCIM**

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Table 4: RCIM controls

Control		Description
1. Emergency Stop button		Immediately powers down the system (including table, OTS, wallstand, and x-ray tubes) and stops image exposure. • To engage: Press the button. • To release: Turn the button clockwise (indicated by the arrows on the button) until it stops, then release.
2. Power On button		Turns on the power for the entire system. Also used in combination with the Auto Positioning button to activate Auto Positioning functions.
3. Reset button		Shuts down and re-starts the system for QAP or in the event of software failure.
4. Expose Hold indicator		Lights up when there is some inhibit to taking exposures. Click the Expose Hold button on the IUI monitor for a list of all current inhibits.
5. Tube Overheat indicator		Lights up when the tube is too hot to continue taking exposures. Allow the tube to cool until the The LED turns off.
6. X-ray Exposure indicator		Lights up when x-rays are being emitted, including tube warm up and QAP.
7. Auto Positioning button		Initiates automated system positioning. Not active in this product.

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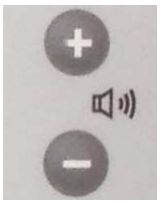
Control		Description
8. Collimator field light button		Turns the collimator field light on or off.
9. Volume control buttons		Adjusts the volume of the system beeps.

SECTION 7
X-RAY TUBE SELECTION

7-1X-ray tube 1

For fluorography examinations, x-ray tube 1 is selected (under table x-ray tube).

ILLUSTRATION 3-3 **Tube1 “Selected”**

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When x-ray tube 1 is not selected, the IDD console appears as follows:

ILLUSTRATION 3-4 **Tube1 “Not Selected”**

7-2X-ray tube 2

For radiography examinations, x-ray tube 2 is selected (over table x-ray tube). The Overhead Tube Suspension (OTS) user interface displays the following typical information:

ILLUSTRATION 3-5 **Tube2 Selected**

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When x-ray tube 2 is not selected, the Overhead Tube Suspension (OTS) user interface console appears as follows:

ILLUSTRATION 3-6 **Tube2 “Not Selected”**

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CHAPTER 4
GETTING STARTED

SECTION 1
INTRODUCTION

This chapter explains the startup and shutdown procedures for your system. It also explains the tube warmup procedure which is important to maximize the life of your tube.

SECTION 2
STARTUP/SHUTDOWN PROCEDURES

This section presents the concepts necessary to successfully perform routine start up and shut down procedures.

- System Startup
- Tube Warmup
- System Shutdown
- Emergency Stop and System Recovery
  - Emergency Stop Recovery
  - System Recovery

2-1System Startup

Before you are able to begin making X–ray exposures, you need to start up the system. Press the “Power On” button located on the left side of the RCIM. The Precision 500D system was designed to be fully serviceable from the IUI control console.

2-2Tube Warmup

Tube Warmup is a procedure that brings the X–ray tube up to a normal operating temperature. The tube has to be brought to this temperature slowly. Tube warmup should be done if no exposures have been made within two hours. This extends the life of the tube.

2-3System Shutdown

The system can remain on. If it is necessary to shut down the system, make sure all sessions are closed and select the shutdown button from the Utilities tab on the IUI Console.

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2-4Emergency Stop and System Recovery

Your system has a large red Emergency Stop button at an accessible location in your imaging facility. This button removes all power from the system. The Emergency Stop button or circuit breaker should be used for emergencies only.

PRESS THE EMERGENCY STOP BUTTON ANYTIME THERE IS AN EMERGENCY CONDITION. THIS REMOVES ALL POWER FROM THE X–RAY SYSTEM.

2-5Emergency Stop Recovery

After an emergency, if you have used the Emergency Stop button, or turned the main circuit breaker off, the system can be returned to normal operation by following the System Start Up procedures.

When the system returns to normal operation, data acquisition sessions in progress will appear on the control console screen. Images that have been acquired and not saved will be recovered so user can save images.

If the emergency stop is activated at power-up, the system will fail to complete the boot process. The operator will need to release the emergency STOP and perform a reset of the system.

2-6System Recovery

There is a gray **System Reset** button on the upper left corner of the control console. This button resets the software if a program becomes locked during an application. Use this button to reset the software and system applications program.

2-7Procedure for Tube Warm Up

This procedure can be performed at your console to preheat the X–ray tube target before you begin your diagnostic examination. Pre–heating the target can extend the life of the tube and prevent damage to the X–ray tube assembly.

Use this procedure to warm up the tube when an exposure has not been made within 2 hours.

1. Check the room to make sure it is clear of all personnel before making X–ray exposures.

    - Do not have a patient or other people in the room while performing tube warm ups.

2-8Bar Code Scanner Option

The digital system can now interface with a Bar code scanner to allow for more efficient and accurate entry of alphanumeric data that would otherwise have been entered via the keyboard.

During Review mode, the bar code scanner provides direct access to patient files for review and update.

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During DICOM Worklist mode, using the bar code scanner makes loading manual queries easier.

2-9International Keyboard Option

The digital system supports English and German language keyboard styles.

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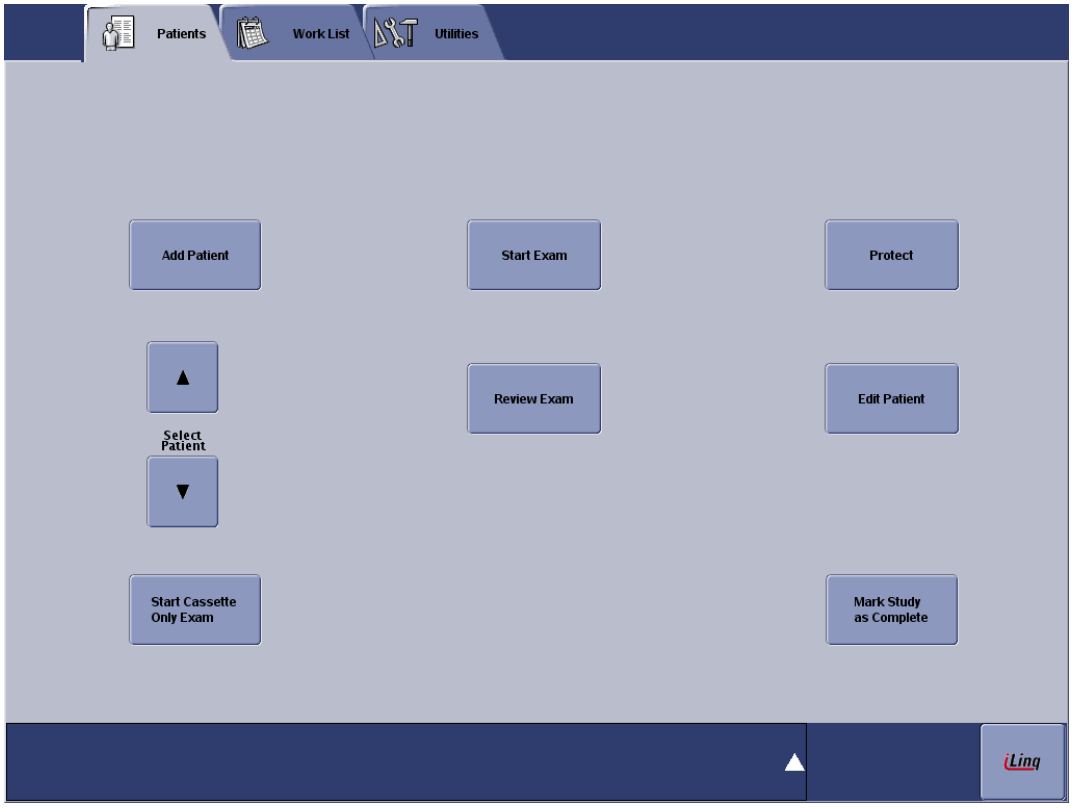
CHAPTER 5
INTEGRATED USER INTERFACE

SECTION 1
INTRODUCTION

The purpose of this chapter explains the functionality of the integrated user interface. This will be the first screen to appear on completion of the power boot–up.

1-1Power–on

ILLUSTRATION 5-1
PATIENTS SCREEN



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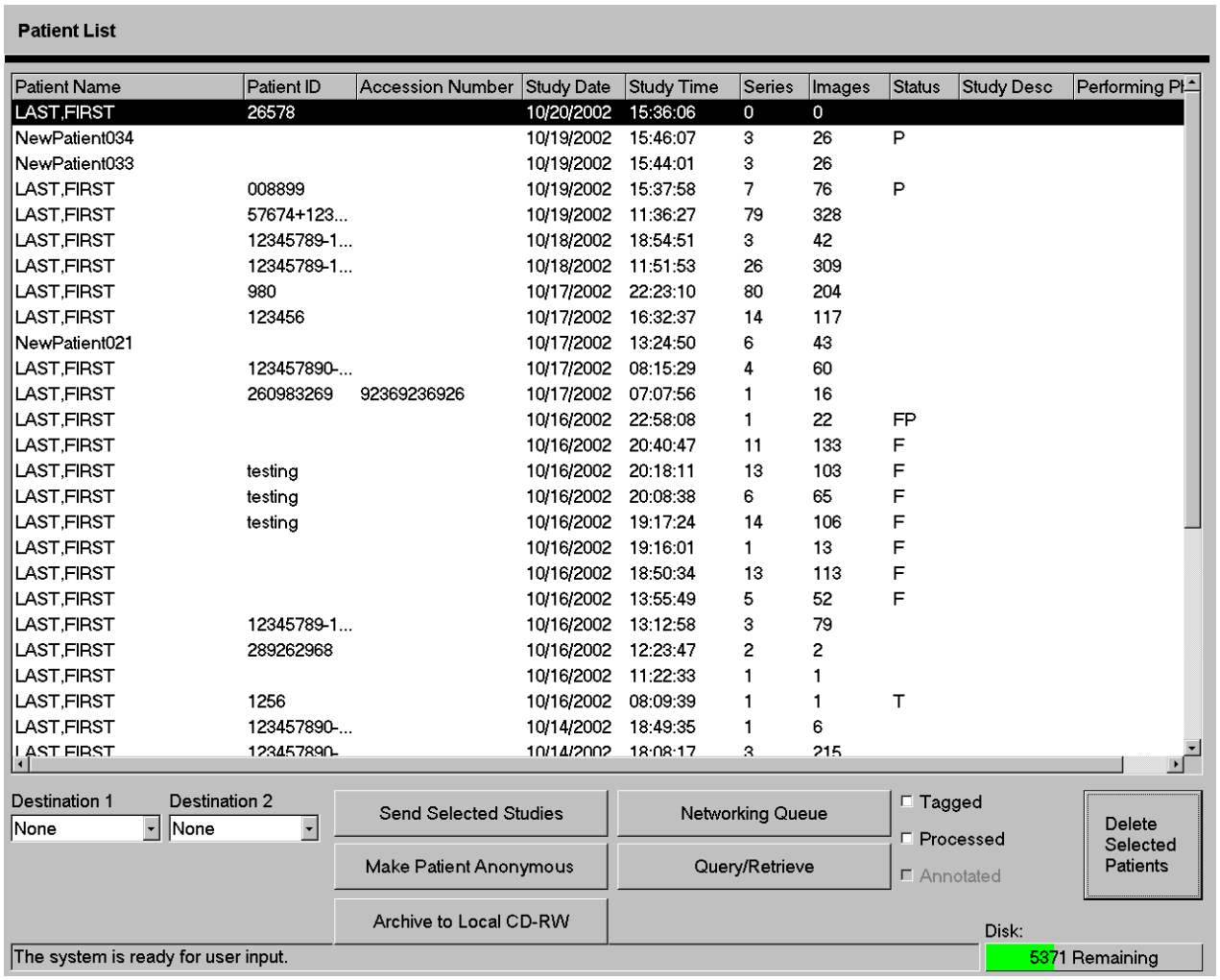
The Digital Image screen displays a Patient List Screen after boot up. For an explanation of the functionality of this screen, refer to Chapter 6, Section 3.

ILLUSTRATION 5-2
PATIENT LIST SCREEN



Depending on system configuration, the exam room monitor is blanked whenever the patient list is displayed (for patient privacy). The exception is for rooms with no control room monitor; in this case the exam room monitor will always display the patient list.

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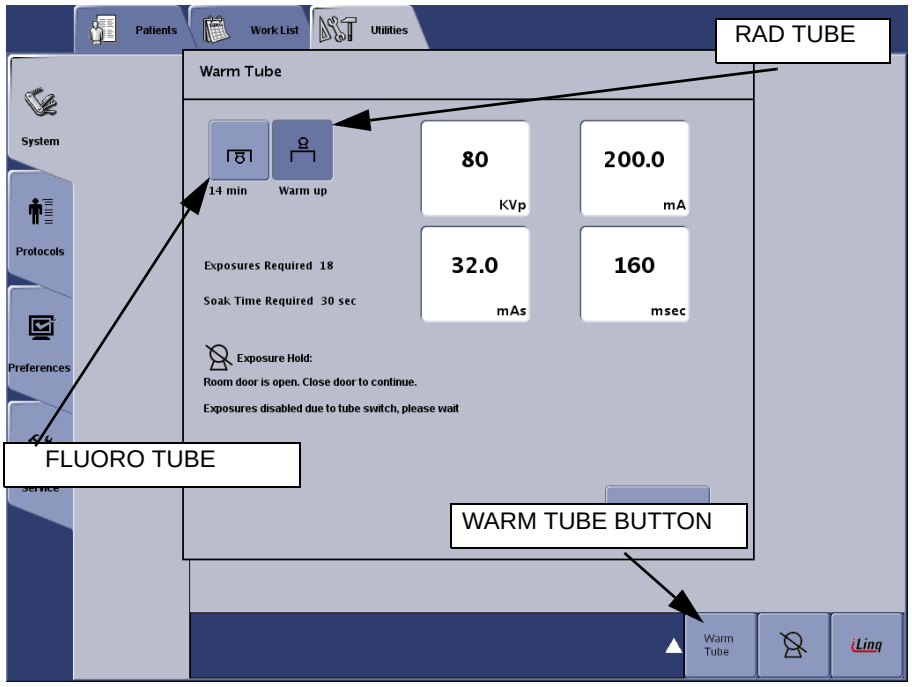
1-2Tube Warm–Up Screen

NOTE: **IMPORTANT!**
A tube warm–up should be performed if the unit has not made an exposure in two hours. This function will help extend the tube life. The **Warm Tube** button will appear when a warm–up is required.

Select the Warm Tube button located on the lower right of the screen as shown in ILLUSTRATION 5-3.

ILLUSTRATION 5-3
WARM TUBE SCREEN



The technical factors as well as the number of exposures are preset. After selecting the appropriate tube for warm up, press the exposure button. Maintaining pressure on the exposure switch will stop at the completion of the warm up procedure. After the soak time has counted to 0 seconds, the close button must be selected to continue.

NOTICE

Please remember to follow all radiation safety standards while performing this and all procedures.

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NOTICE

When performing a tube warm-up procedure for the under table or over table x-ray tube, the operator must remember that a tube warm up procedure produces a series of exposures and therefore produces a small amount of scatter radiation even though the collimator blades are at their minimum open position. Therefore, the following steps are recommended to be taken to minimize the effect of this small amount of non-diagnostic radiation in addition to the normal precautionary steps taken when producing diagnostic radiation. Secondarily, these steps will also help protect the Image Intensifier input phosphor from being irradiated when power is not being applied to it when performing an under table tube warm up.

1. **It is not recommended to have a patient on the table or people in the room while performing under and over table tube warm-ups. Perform under and over table tube warm-ups before people enter the room or while the patient is being prepared for the procedure. For over table tube warm-ups, move the XT to a remote corner of the room.**
2. **Move the table bucky to a position so that it is over the table tube. This position on the table top is directly below the Image Intensifier and Intelligent Spot Film Device.**
3. **Lay a lead apron on the table top in a position so that it is over the table tube and collimator.**

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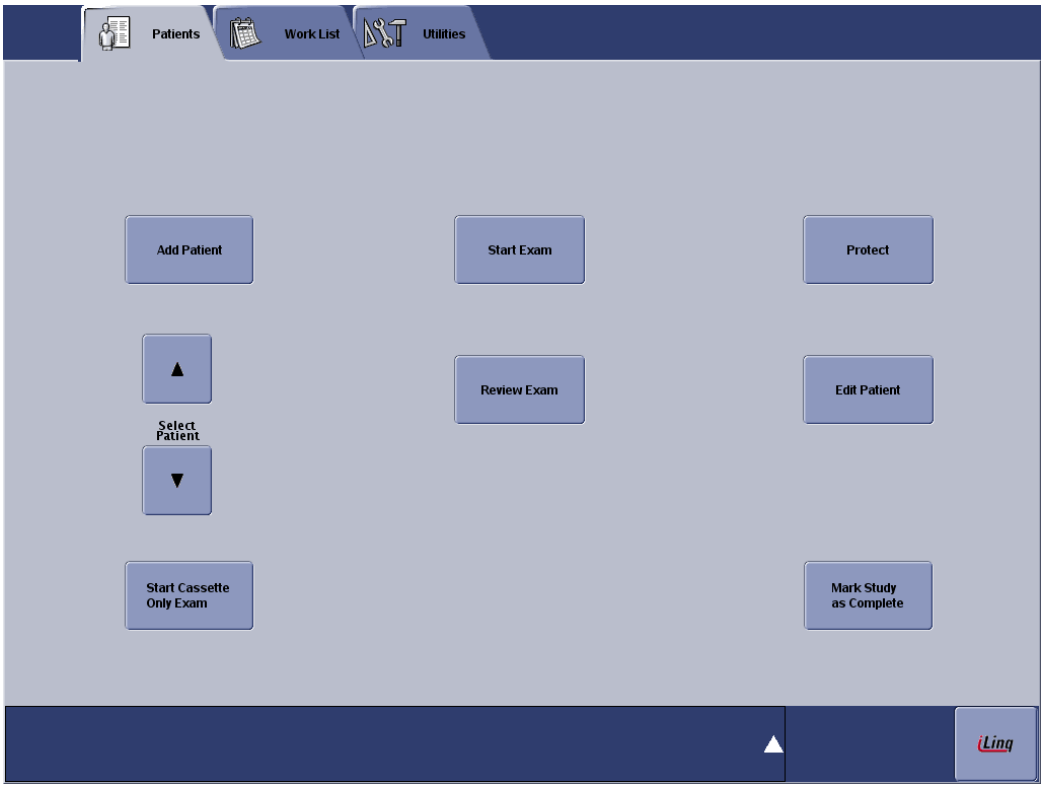
NOTICE

Follow precautionary measures, do not perform Tube Warm–Up with patient(s) or personnel in the exam room.

NOTE: At completion of Tube warm-up procedure, the user will return to the last Tube Warm-up screen viewed before the Tube Warm-up test was selected.

ILLUSTRATION 5-4
PATIENT SCREEN



The following tabs, located across the top of the screen, are selected from the Patient Screen on the IUI console:

- Patient List: This will display the patients on the Digital system.
- Work List: This will display the patients registered for procedures from the facility HIS/RIS
- Utilities: Protocol addition and editing, as well as system services functions are available with this selection.

1-3Add/Select Patient Screen

NOTE: During patient information entry these characters are not allowed in any data fields: < > ? / : \ ! ^ * & .

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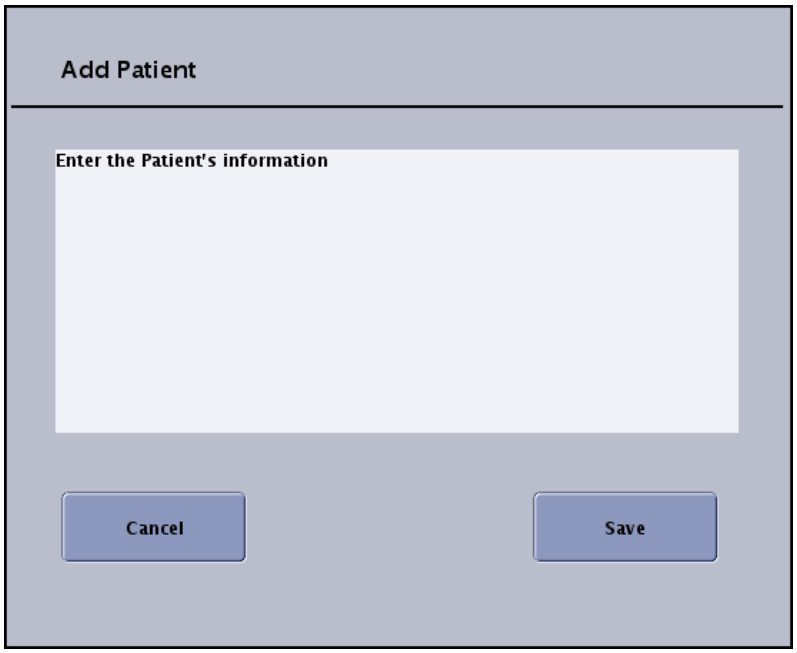
Patient List tab button selections:

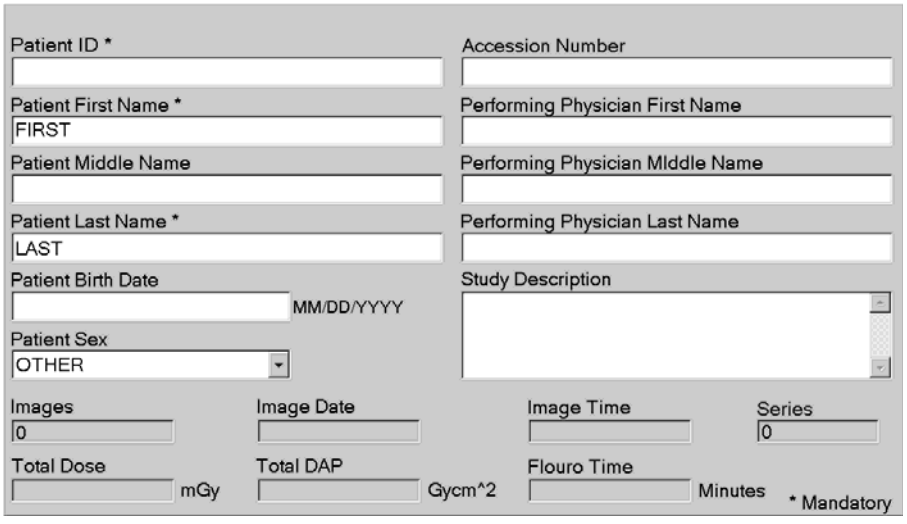
- **Add Patient:** This function places additional patients into the system. A dialog screen appears on the Digital Image Monitor which prompts the operator for pertinent patient information. See ILLUSTRATION 5-6.

ILLUSTRATION 5-5
PATIENT LIST SCREEN



The digital monitor displays a dialog box to input patient information.

ILLUSTRATION 5-6
PATIENT INFORMATION SCREEN



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NOTE: Patient List Screen will only accept a maximum of 44 characters for the first, middle and last names combined. If the first, last and middle names combined exceeds 44 characters; the field will be truncated to 44 characters.

The same rule applies to entering the Physician's name.

- **Select Patient:** The up arrow will scroll up the list of patients, and the down arrow will move down the list displayed from the Patient List or Work List. Refer to ILLUSTRATION 5-2.
- **Start Exam:** This will signal the unit that a patient has been selected for a procedure and the system is placed in an acquisition mode.
- **Review Exam:** The system will be placed into a review/filming mode.
- **Protect:** By selecting a patient and pressing Protect, this particular exam cannot be removed. By following the same steps on a protected patient the Protect field will be removed and the exam can be deleted.

  An **"L"** will appear in the Status column on the Patient List Screen when the Protect button is selected. Refer to ILLUSTRATION 5-7.
- **Edit Patient:** This button gives you the ability to adjust patient data, name, and patient ID if entered manually. Patients selected from the worklist cannot be edited.
- **Start Cassette Only Exam:** This selection indicates that only the overhead tube will be utilized for imaging the patient without the assistance of fluoro. Procedures can be performed without selecting from the worklist. No patient name will be visible during procedures.
- **Mark Study as Complete**

  An **"F"** flag which appears in the Status column means that the patient's exam is completed. This signals the HIS/RIS database to accept patient exam as being done. Refer to ILLUSTRATION 5-7.

NOTE: Once a patient is listed as complete or **"F"**, no more exams can be accepted under that particular exam session.

NOTE: A **"V"** in the Status column denotes the exam is verified against the HIS/RIS system.

A **"T"** in the Status column denotes the exam was transferred to a PACS station.

An **"A"** in the Status column denotes the exam was archived to a CDRW.

A **"P"** in the status column denotes a print of the selected image has completed.

NOTE: The maximum number of series to any exam is 80. There is no limit to the number of images in a patient study.

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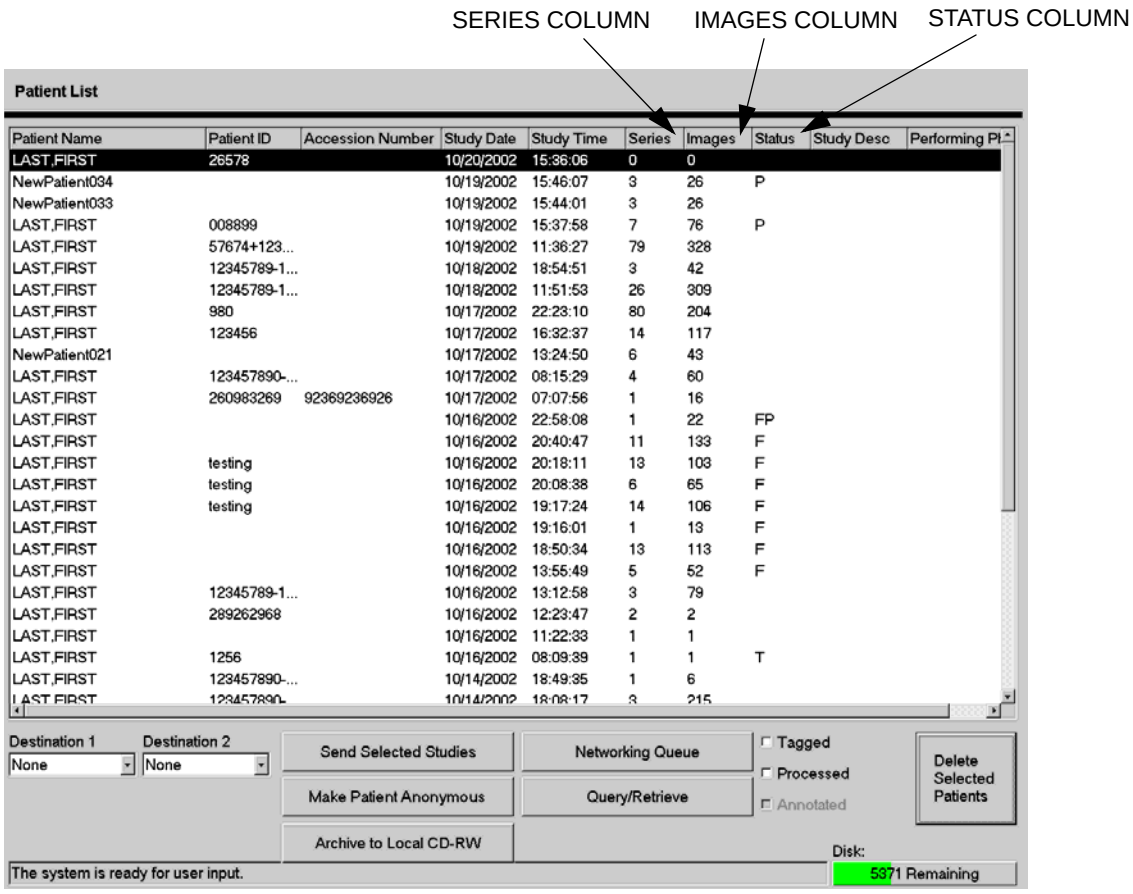
ILLUSTRATION 5-7
COLUMN DESCRIPTIONS



SECTION 2
START EXAM

2-1Start Exam Scenario

A patient can be selected from the worklist or an existing patient from the patient list. In this example, HIS/RIS is available and the patient is registered for a procedure.

Depending on system configuration, the exam room monitor is blanked whenever the patient list is displayed (for patient privacy). The exception is for rooms with no control room monitor; in this case the exam room monitor will always display the patient list.

Select Work List tab.

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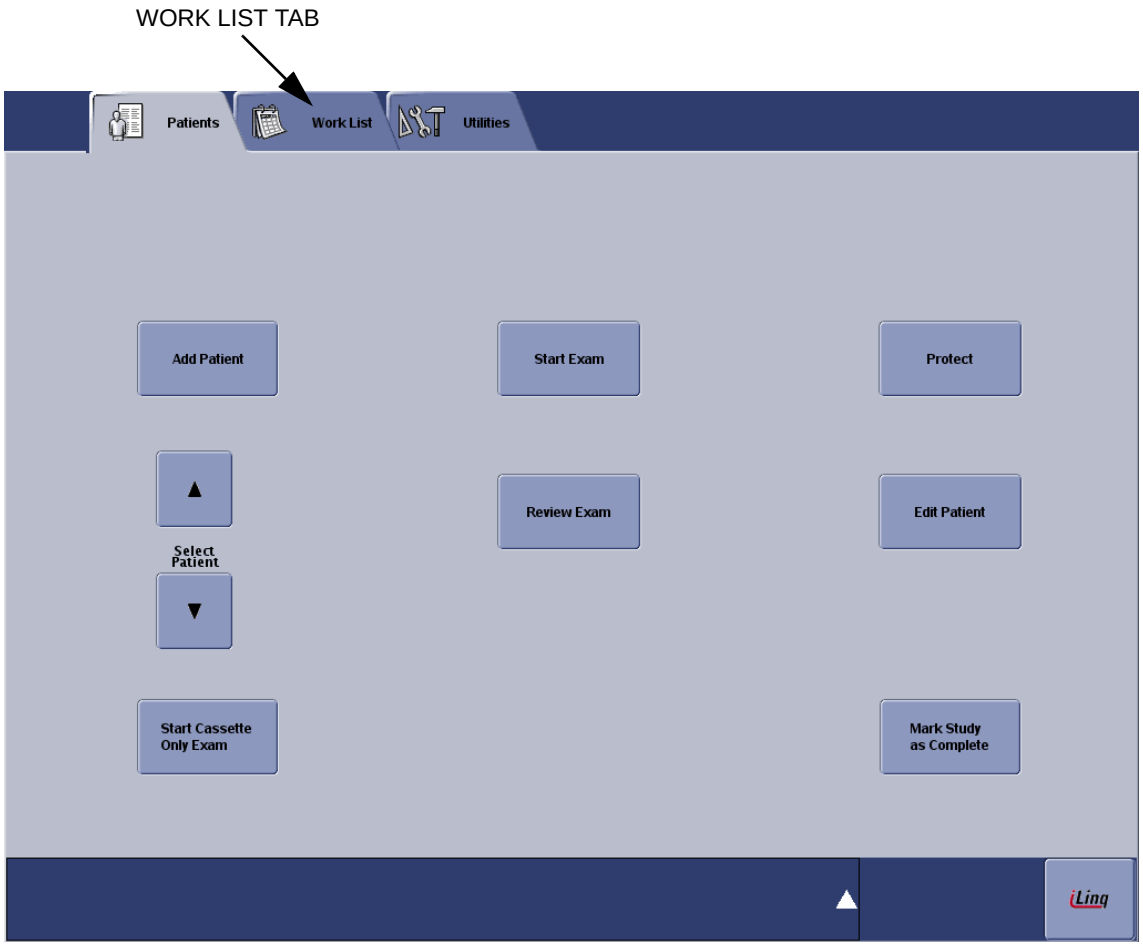
ILLUSTRATION 5-8
PATIENT SCREEN



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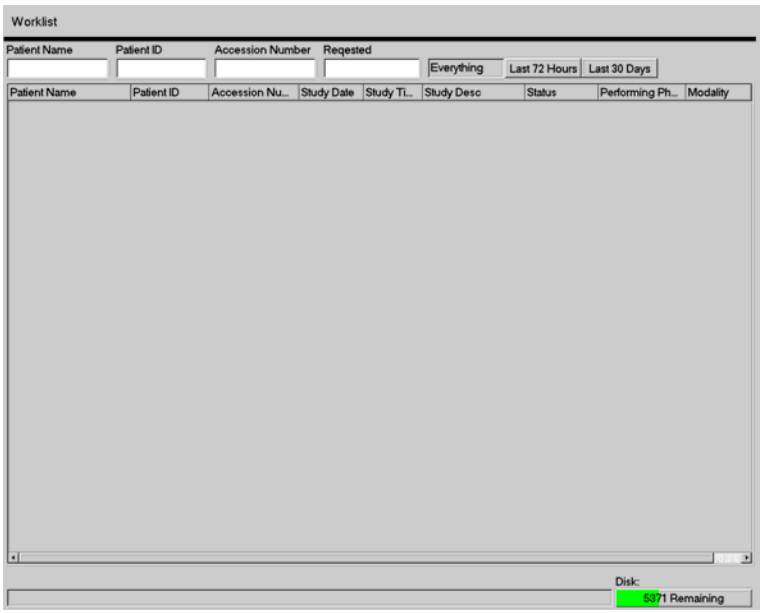
A Patient Work List appears on the Digital Image Screen. Select a registered patient for an image acquisition.

ILLUSTRATION 5-9
DIGITAL MONITOR WORKLIST SCREEN



Select Start Exam from the IUI Console. Refer to ILLUSTRATION 5-10.

ILLUSTRATION 5-10
IUI WORKLIST SCREEN

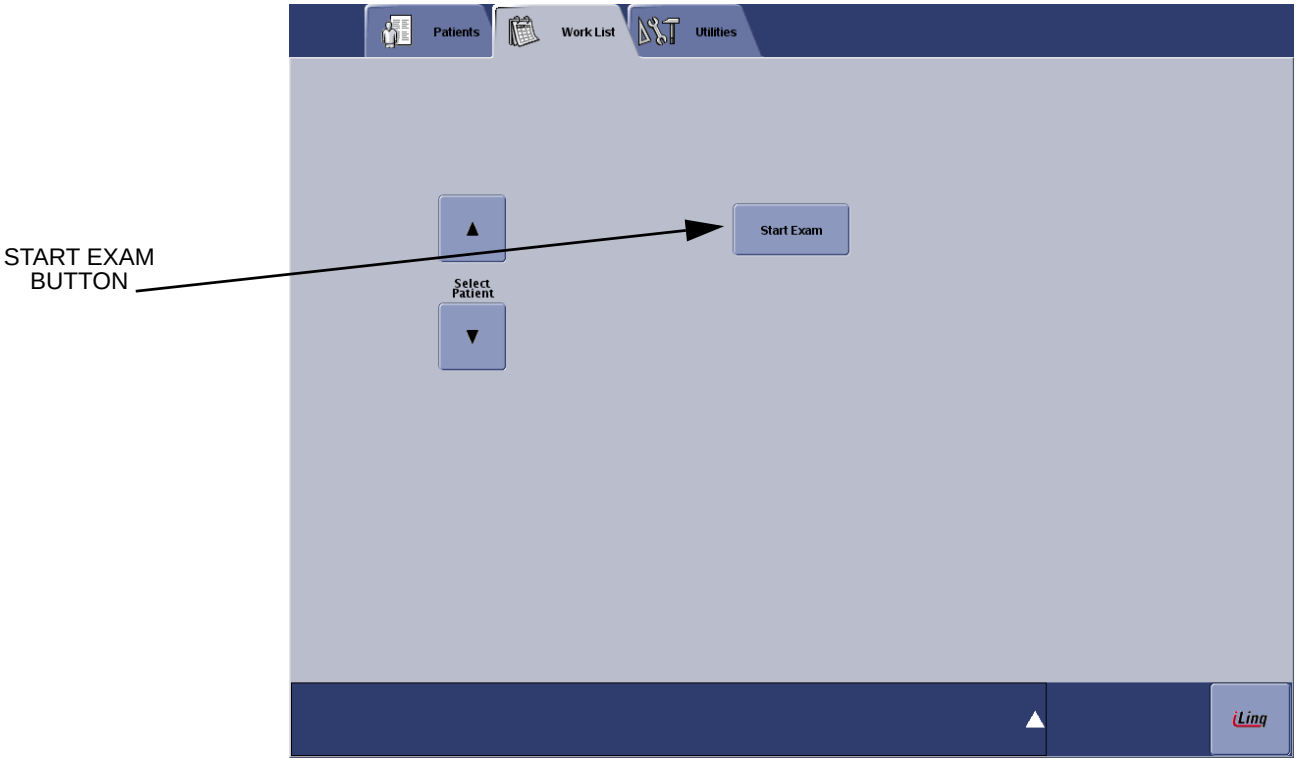


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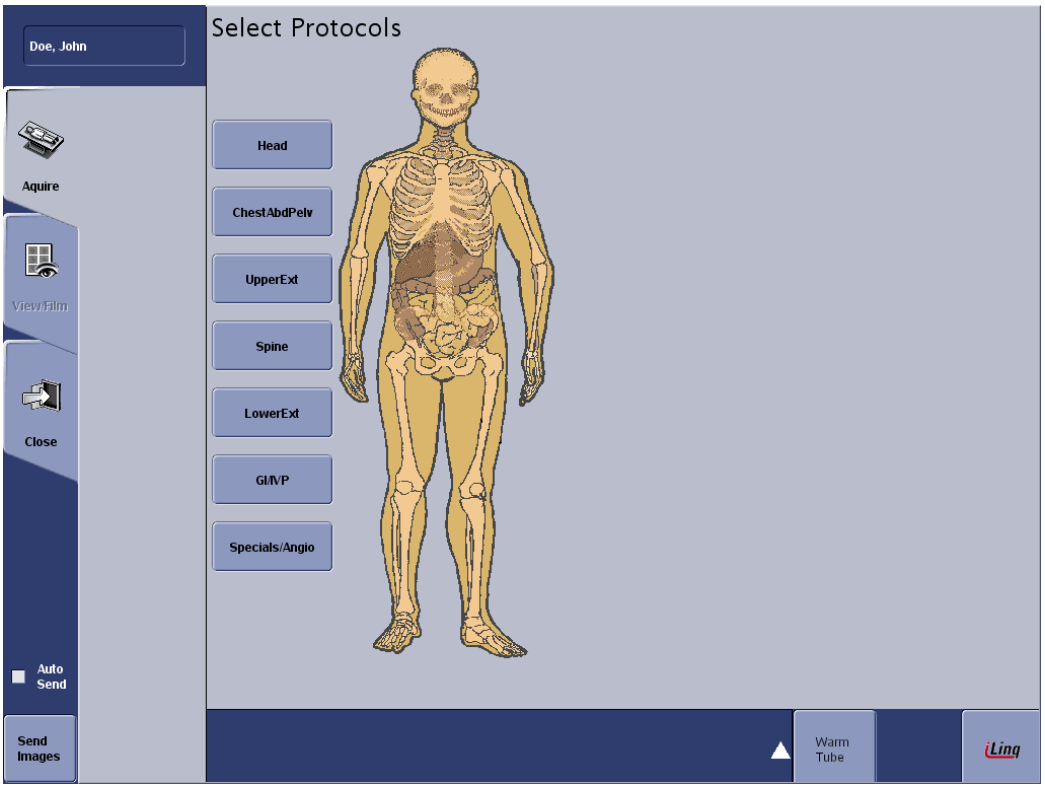
ILLUSTRATION 5-11
SELECT PROTOCOLS SCREEN (1)



This screen will display the patient's name selected for acquisition. By pressing the Select Protocols button, you will be able to choose an anatomical category.

No patient name will appear if cassette only has been selected.

Image Monitor screen will display a blank screen except for the "Site Name".

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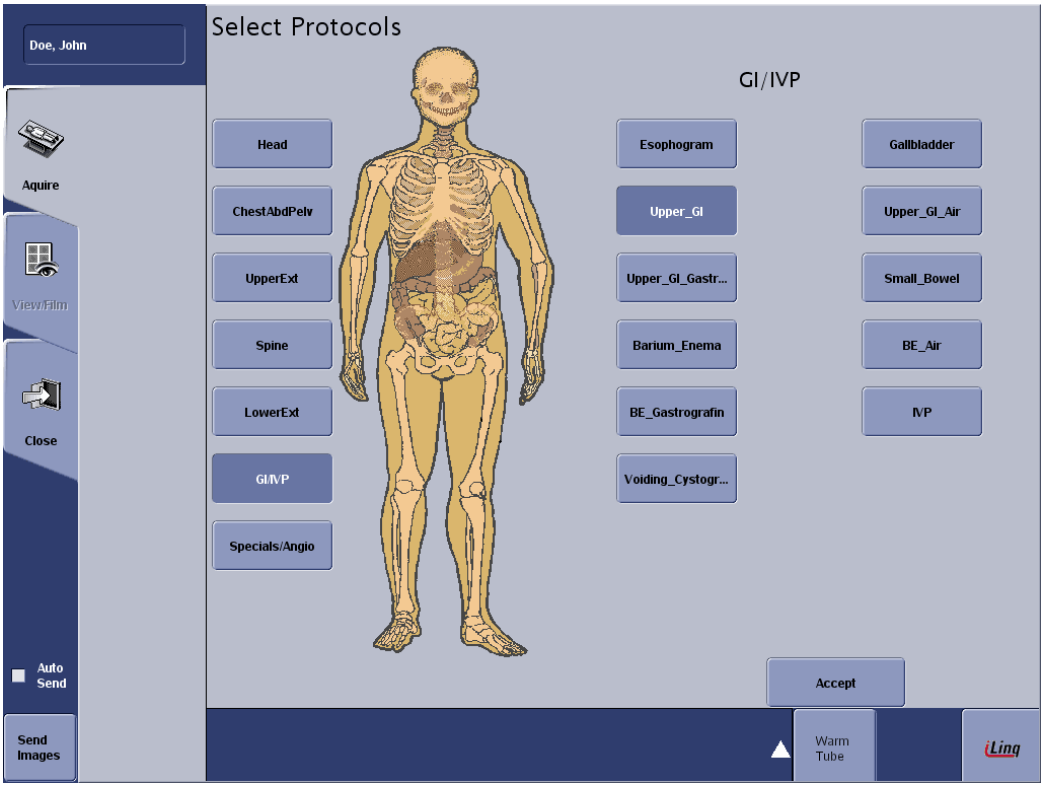
After the major category is selected, protocols will be displayed as in the next screen.

ILLUSTRATION 5-12
SELECT PROTOCOLS SCREEN (2)



Select the procedure you wish to perform and press **Accept**.

Multiple procedures from different categories may be selected before pressing **Accept**.

NOTE: To custom create or alter examination protocols, refer to the Section 3 for step by step instructions.

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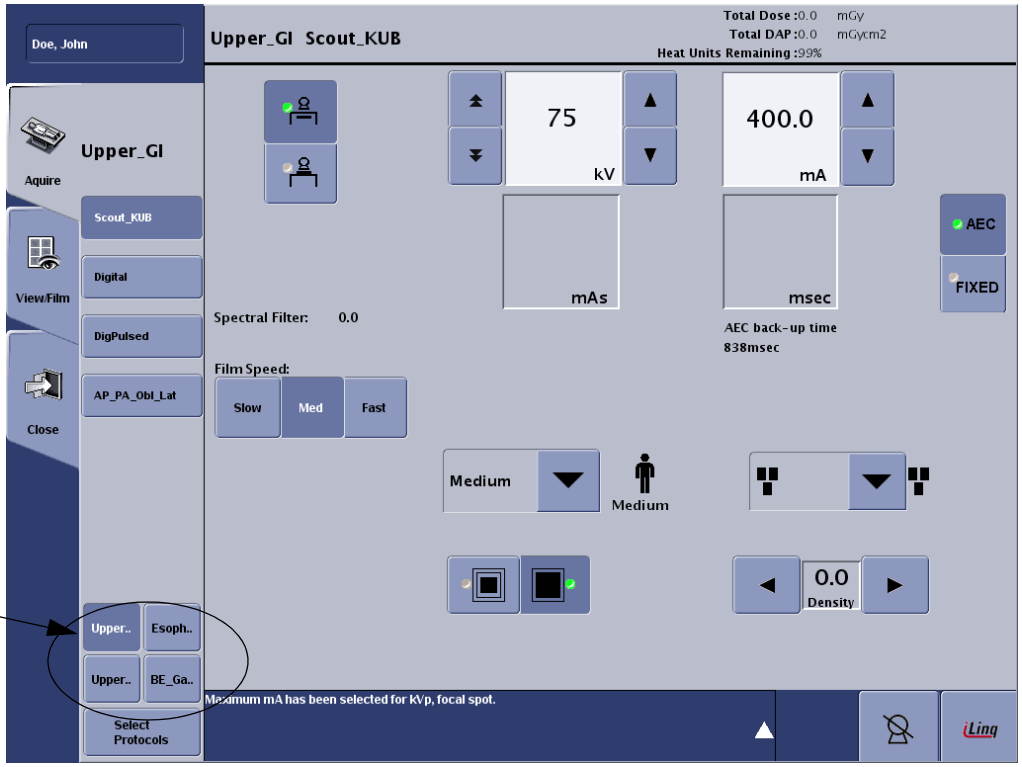
Acquisition screens have patient identification, procedure selected, technical factors and receptors (table bucky, digital, etc. appropriate for your system).

NOTE: The “Select Protocols” button located in the lower left of the IUI screen returns to the Select Protocols screen. See ILLUSTRATION 5-12. This screen allows more tests for the same patient be added. Buttons will build up denoting the additional tests. Select each button to review the test parameters prior to acquiring the image.

ILLUSTRATION 5-13
ACQUISITION SCREEN (1)



BUTTONS ARE ADDED IF SEVERAL PROTOCOLS ARE SELECTED

kVp
The arrow up/down 10 indicates that by selecting these buttons you will increase or decrease by 10 kVp increments for each push. The up/down arrows without 10 increase and decrease by 1 for each push.

mA
The up/down arrows will increase and decrease in accordance with the focal spot selected.

mAs/msec
If AEC is selected, the actual used factors will appear at the completion of the exposure. If fixed is selected, you will have the ability to increase and decrease the mAs as needed.

Patient Size
There are four selections for patient size, large medium, small adult and pediatric.

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Focal Spot
There are two focal spot selections small 0.6 and large 1.25.

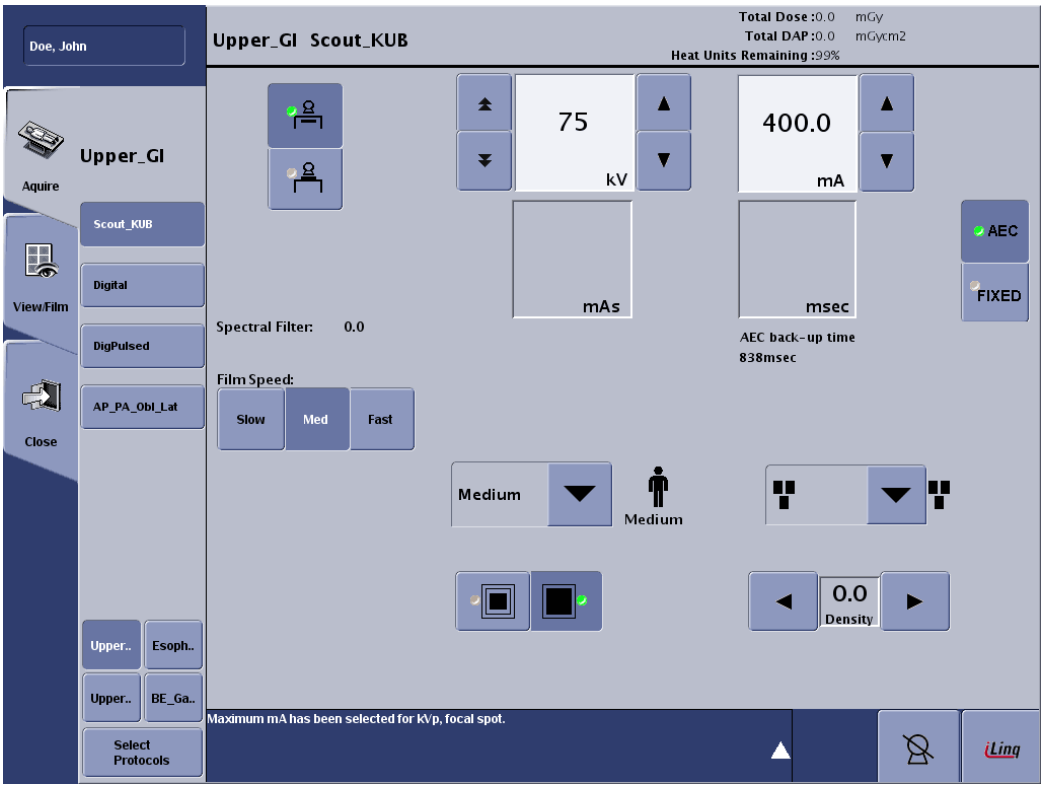
Total Dose
Total skin dose to patient for entire exam (fluoro and record images).

Total DAP
DOSE x AREA EXPOSED = PRODUCT (total area exposed during exam)

Ion Chambers/AEC cells
By pressing the Ion Chamber button, it will display all available combinations.

Density
Density may be increased or decreased by using the arrows. Each step will change the density by 25%.

ILLUSTRATION 5-14
ACQUISITION SCREEN (2)



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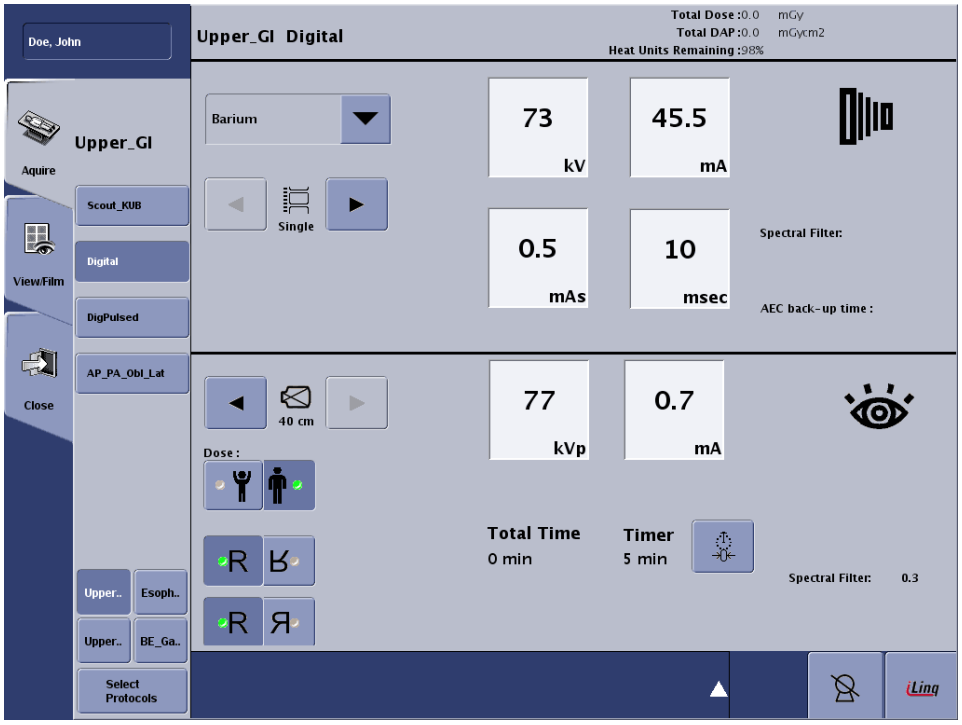
2-2Fluoro Acquisition Screen

ILLUSTRATION 5-15
FLUORO ACQUISITION SCREEN



Selections

- This screen will display record factors as well as fluoro factors.
- The top portion of the screen is dedicated for record factors.
- You may change your contrast type for the trajectories to compensate technical parameters. However it is recommended to use the appropriate contrast per procedure.
- The other option is frames per second. You may select single, 1, 2, 3, 4, 5, 6 or 7.5 maximum.
- The lower portion of the screen is dedicated to fluoro factors.
- You may select the image intensifier size. (This is system dependent.)
- The Field of View options are 16, 12, 9, 6 or 12, 9, 6, 4.5 inch (40, 32, 22, 16 cm or 32, 22, 12, 9 cm) modes.

Pediatric Dose Selection (optional) - Provides specialized image acquisition parameters for small pediatric patients. This special purchase option provides dedicated and tailored dose trajectories for infants and small children.

- The dose can be limited to one of three rates: the standard 10 R/minute grid in or 5R/minute input dose (grid in or out).
- Provides the optimum mix between minimal dose and maximum image quality.
- The pediatric mode is not available in Germany or New Zealand due to existing low dose regulations.

Pulsed Fluoro (option) - The system works with 15, 7.5 and 3.75 frames per second. After selecting, the rates can be changed at the IDD.

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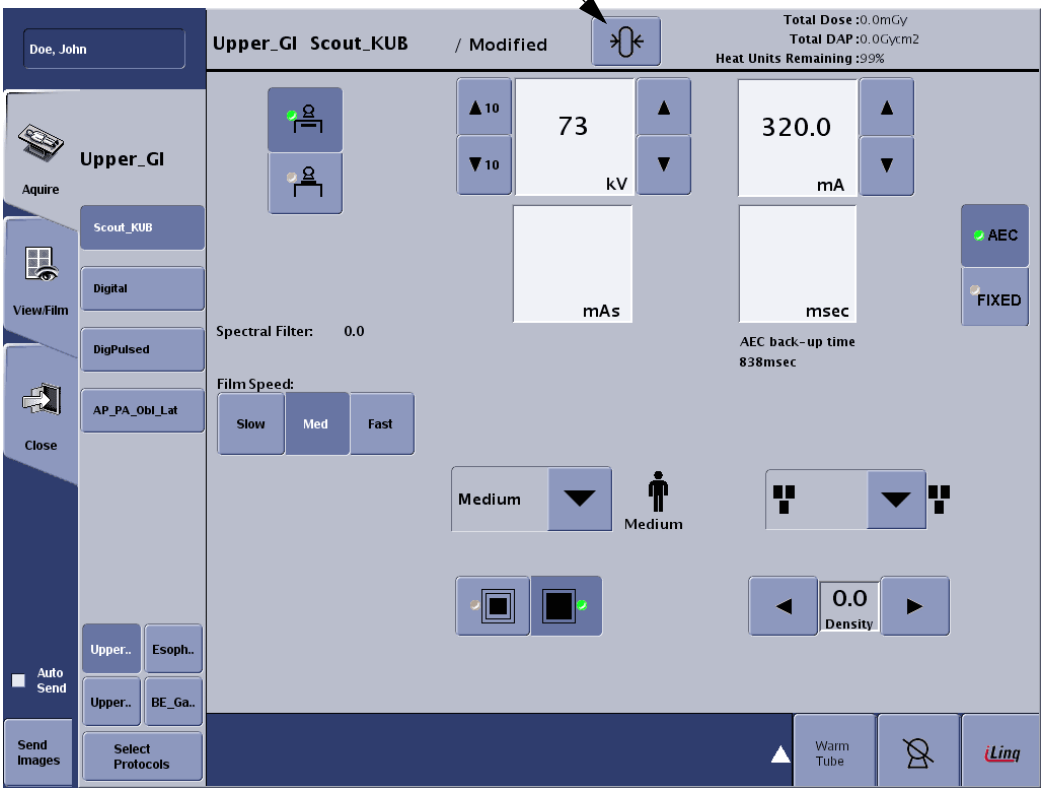
ILLUSTRATION 5-16
MODIFIED PROTOCOL

MODIFIED PROTOCOL

If button is selected, it will revert to the existing protocols in the database.



If a change is made to a stored protocol it will be noted as Modified on the screen.

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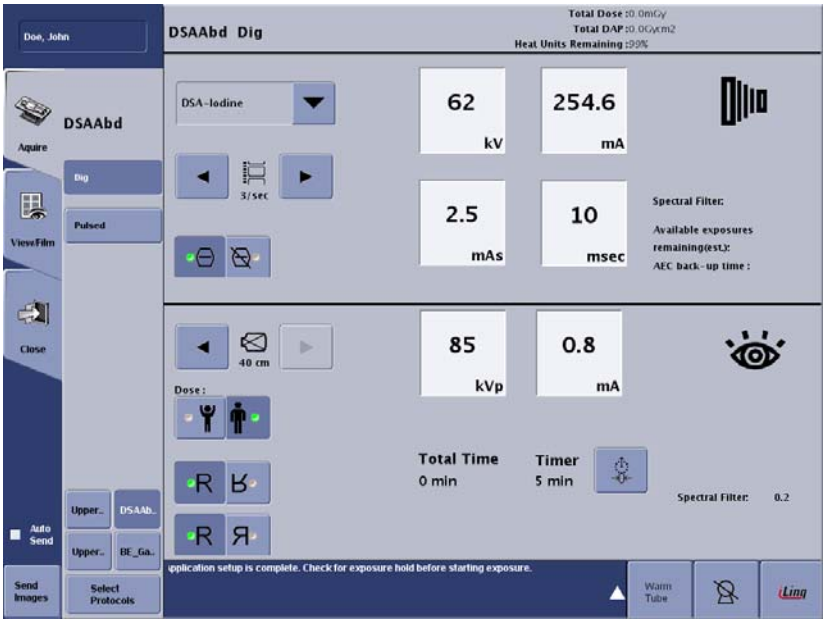
2-3Angio Acquisition Screen (Option)

ILLUSTRATION 5-17
ANGIO ACQUISITION SCREEN



Pediatric Dose Selection (optional) provides specialized image acquisition parameters for small pediatric patients. This special purchase option provides dedicated and tailored dose trajectories for infants and small children.

- The dose can be limited to one of three rates: the standard 10 R/minute grid in or 5R/minute input dose (grid in or out).
- Provides the optimum mix between minimal dose and maximum image quality.
- The pediatric mode is not available in Germany or New Zealand due to existing low dose regulations.

This screen will display record factors as well as fluoro factors for a subtracted or non subtracted acquisition. The availability of the subtraction capability is programmed in the Protocol Edit function. During an Angio acquisition you have the ability to acquire in real-time, subtracted mode or as a non subtracted run. No matter the mode of acquisition, it may be reversed during review.

If the button is highlighted this is the indication that the acquisition will be subtracted. At the depression of the exposure switch, two non subtracted images will appear. The first will adjust the technique the second will be utilized as the mask. From this point your sequence will be in the subtracted mode.

NOTE: Keep the exposure switch depressed until the completion of the run.

If the is highlighted, the acquisition will be acquired in the non subtracted mode. If desired, this series can be reviewed in subtracted mode.

NOTE: The use of the Bolus Lock is not available during a subtracted acquisition.

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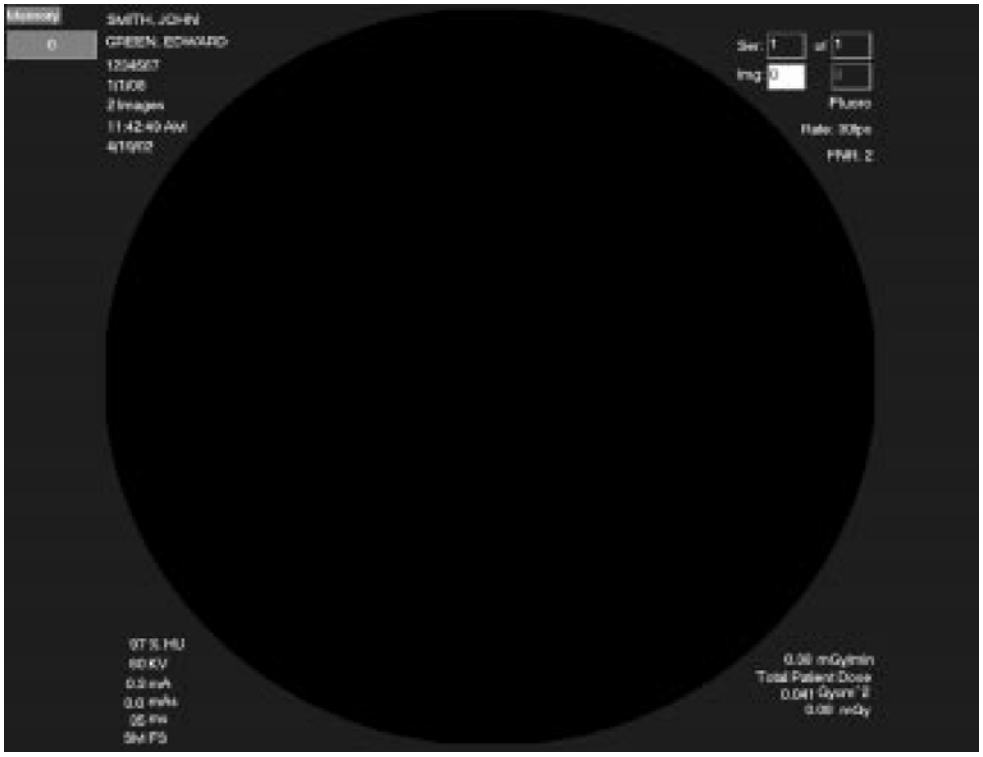
The Image Monitor will display the following screen:

ILLUSTRATION 5-18
IMAGE MONITOR SCREEN



2-4Video Presentation

These selections will change image presentation head/foot and left/right.

2-5Fluoro Time

Total fluoro time is displayed.

The 5 minute fluoro timer can be rest by pressing the button. An audible alarm will sound at the completion of 5 minutes. You may continue to fluoro with the audible tone for another 5 minutes. However at the end of the second 5 minute period the time must be reset otherwise fluoro will be discontinued until this is done.

Total patient dose and Dose area product is displayed in the upper right corner of the screen.

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2-6View/Film

This is utilized at the completion of an exam for filming and/or networking or during an exam to review all images in the series for possible additional films.

ILLUSTRATION 5-19
VIEW/FILM SCREEN

This symbol indicates the image has been tagged. Touch the desired number frame to Tag

1 Prior/Next Image

2 Prior/Next Page

3 Prior/Next Series

4 Play/Pause Series -
The Play/Pause button is a three-state button. The first time it is pressed, the current series begins playback. The next button press begins playback of all series in the exam. The next button press will pause the pause (stop) the playback.

5 Delete Image / Delete Series -
The The Delete Image button will mark the currently selected image for deletion. The Delete Series button will mark the entire series (currently selected) for deletion. Deletion occurs when the exam is closed.

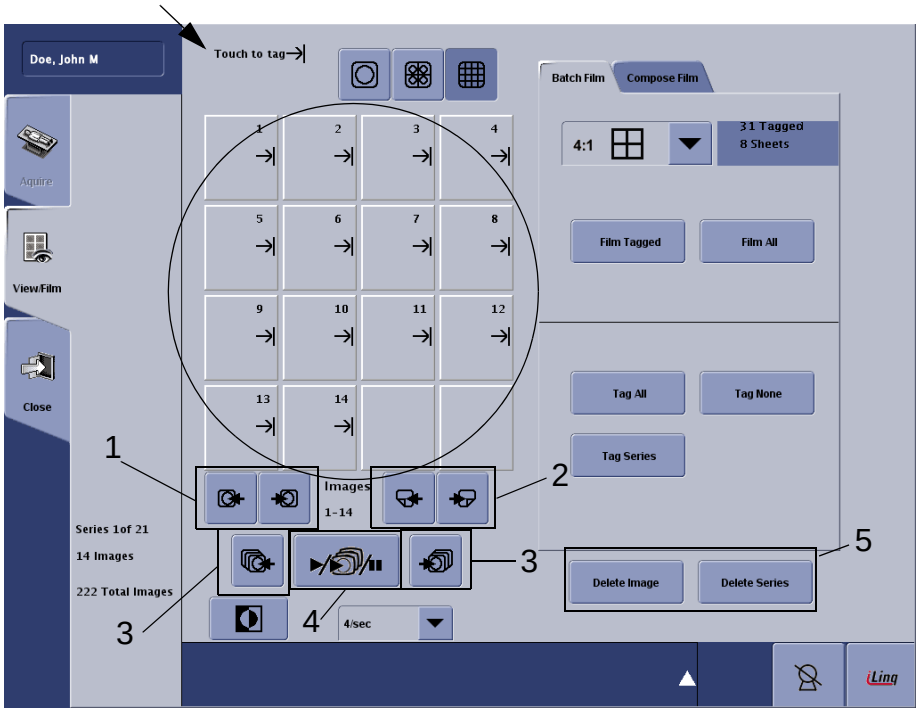

Image Review
Multi view

- The system can display 1, 4, or 16 images from the study.
- The format that is displayed here will match the image display on the monitor.
- The images can be paged through with the “Prior” and “Next” buttons. See callout 1 in ILLUSTRATION 5-19.
- If there are more images than can be displayed in the selected multi–file you will press the page Prior or Next button. See callout 2 in ILLUSTRATION 5-19.
- If there are rapid sequences in the series, the multi image buttons will move Prior or Next through the sequence. By depressing the Play/Pause button it will play at acquisition speed. See callout 3 and 4 on ILLUSTRATION 5-19.
- The rate may be changed by selecting Replay Rate and making your replay frame choice. By touching this display the appropriate image can be tagged or untagged for filming or networking

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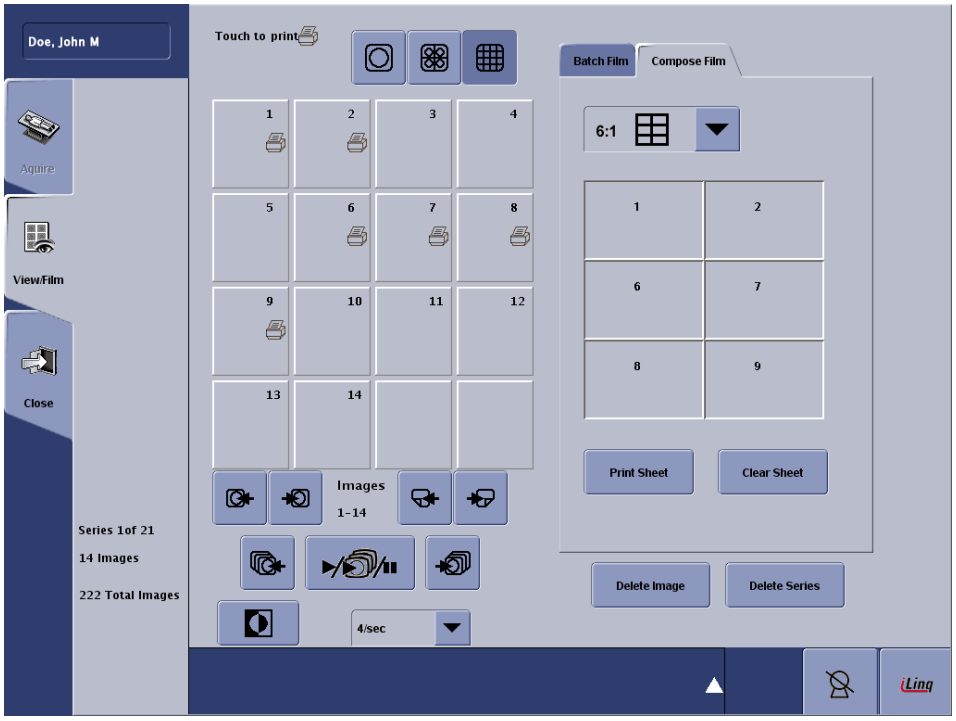
2-7Filming

The filming options are displayed to the right of the screen.

Batch Filming
This will display the selected film format, the number of images tagged for filming and the number of films required for this job.

You may choose to film the entire study or only tagged images with the selector buttons Film All or Film Tagged.

ILLUSTRATION 5-20
FILMING FORMAT SCREEN



Film Composer

- This composer is for studies that may require images to be in a different order or aligned in a specific way.
- The order of the images that are selected will be: Left to Right and Top to Bottom, in Multi View tiles.
- The system will display the image number to its appropriate film location.
- Press **Print Sheet** to send the data to the laser imager
- Press **Clear Sheet** to remove selected images from sheet without printing.
- To re–configure an image sheet, press **Film Format**.

You may toggle between view film and acquisition if additional images are required.

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Mark Study as Complete After the completion of an examination the close button is pressed. A pop up dialog box appears which asks the operator if the study should be marked as complete. If “Yes” is selected an “F” is placed in the Status column in the Patient List screen and the file is locked. Refer to ILLUSTRATION 5-22.

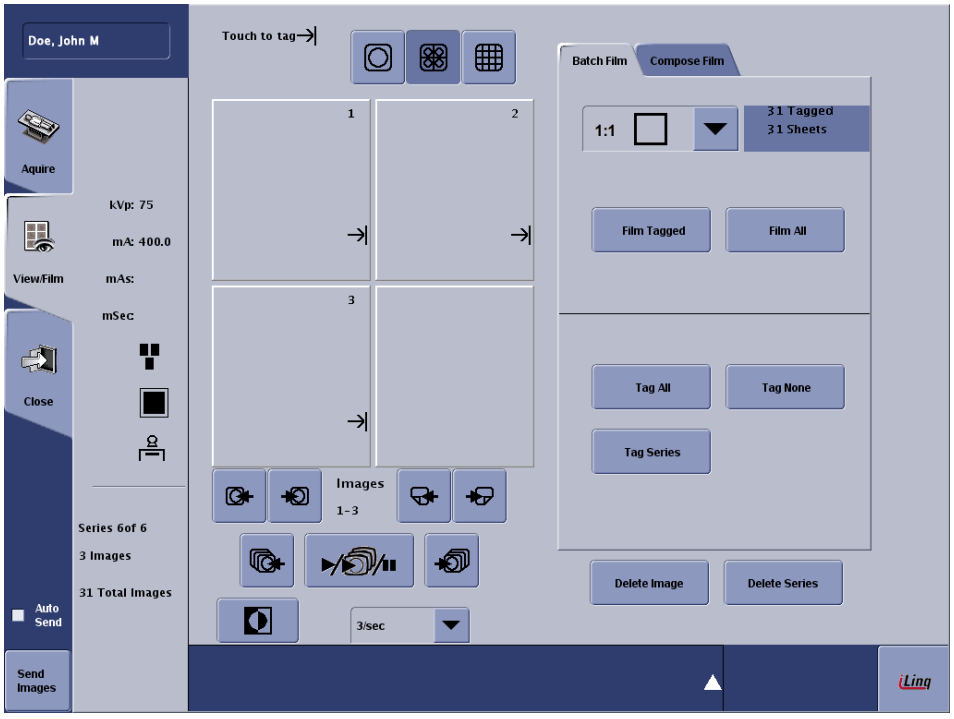
No additional images will be added to the patient study and all data will be sent to the network if a PACS system is connected.

If “No” is selected, the patient may be selected from the patient list at a later time and additional images can be added to this study.

Refer to Section 1-3 for details of this feature.

2-8Radiographic Exposure / Review Multitasking

ILLUSTRATION 5-21
Radiographic Exposure / Review Multitasking Screen



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This feature allows Radiographic Overtable exposures while reviewing digital record series.

- Select a digital record protocol which has a radiographic protocol step.
- Acquire digital record exposures.
- Select the radiographic protocol step and review/modify the techic as needed.
- Press the View/Film button to review the digital record images.
- The radiographic technic is displayed on the review screen and a radiographic exposure can be taken.

2-9Archive to Local CD–RW (OPTION)

NOTE: Only 300 images can be archived per CD. The system alerts the user if more than 300 images are selected.

If a power outage occurs while storing images to a CD-RW and the RESET button located on the RCIM is pressed or the Emergency Stop button on the table or RCIM is pressed; any archived information on the CD-RW becomes unusable. The archiving procedure must be restarted.

Selected patient images can be archived to a CD–RW.

- A blank CDRW must be inserted into the CD drive located on the top of the IUI console.
- From the Patient List Screen, select the desired patient images to be stored onto a CD.
- To select a group of images that are listed next to each other:
  Select one patient file from the list
  A darkened stripe will appear across the file line as shown in ILLUSTRATION 5-22,
  Hold the SHIFT key down,
  Select the last patient file desired,
  A darkened box will appear between the first and last files selected,
  These are the images that will be sent to the CD for archiving.

OR

- To select a group of images that are listed in random order:
  Select one patient file from the list
  A dark stripe will appear across the file line as shown in ILLUSTRATION 5-22,
  Hold the CONTROL key down
  Select as many patient files as desired
  Each patient file selected will darken as they are selected
  These are the images that will be sent to the CD for archiving.

When the desired files are selected:

- Select the ARCHIVE TO LOCAL CD–RW button located on the bottom of the Patient List screen as shown in ILLUSTRATION 5-22.

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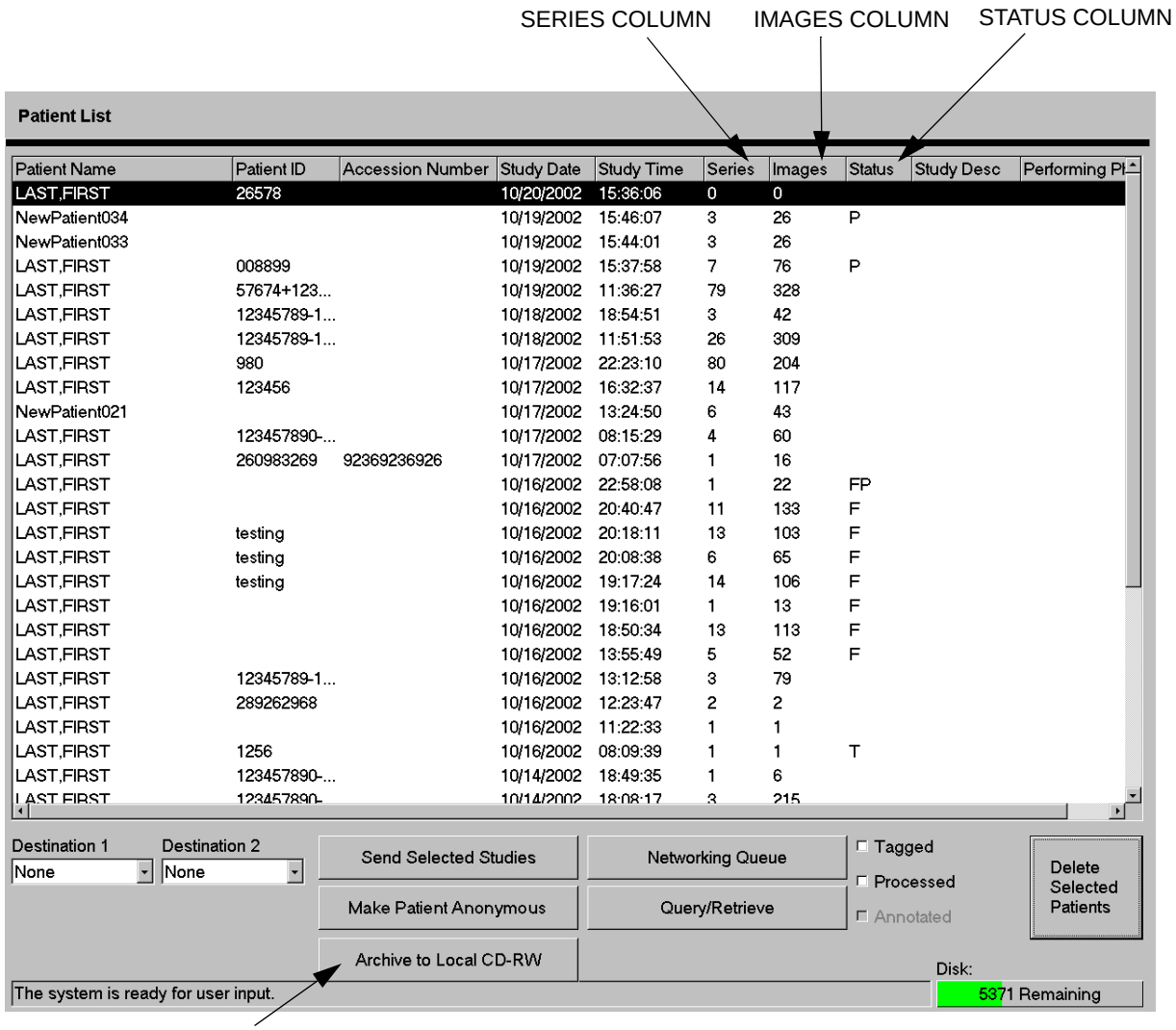
ILLUSTRATION 5-22
AUTO ARCHIVE CDRW


SERIES COLUMN
IMAGES COLUMN
STATUS COLUMN
Patient List
Patient Name | Patient ID | Accession Number | Study Date | Study Time | Series | Images | Status | Study Desc | Performing Pl
LAST,FIRST | 26578 | | 10/20/2002 | 15:36:06 | 0 | 0 |
NewPatient034 | | | 10/19/2002 | 15:46:07 | 3 | 26 | P |
NewPatient033 | | | 10/19/2002 | 15:44:01 | 3 | 26 |
LAST,FIRST | 008899 | | 10/19/2002 | 15:37:58 | 7 | 76 | P |
LAST,FIRST | 57674+123... | | 10/19/2002 | 11:36:27 | 79 | 328 |
LAST,FIRST | 12345789-1... | | 10/18/2002 | 18:54:51 | 3 | 42 |
LAST,FIRST | 12345789-1... | | 10/18/2002 | 11:51:53 | 26 | 309 |
LAST,FIRST | 980 | | 10/17/2002 | 22:23:10 | 80 | 204 |
LAST,FIRST | 123456 | | 10/17/2002 | 16:32:37 | 14 | 117 |
NewPatient021 | | | 10/17/2002 | 13:24:50 | 6 | 43 |
LAST,FIRST | 123457890-... | | 10/17/2002 | 08:15:29 | 4 | 60 |
LAST,FIRST | 260983269 | 92369236926 | 10/17/2002 | 07:07:56 | 1 | 16 |
LAST,FIRST | | | 10/16/2002 | 22:58:08 | 1 | 22 | FP |
LAST,FIRST | | | 10/16/2002 | 20:40:47 | 11 | 133 | F |
LAST,FIRST | testing | | 10/16/2002 | 20:18:11 | 13 | 103 | F |
LAST,FIRST | testing | | 10/16/2002 | 20:08:38 | 6 | 65 | F |
LAST,FIRST | testing | | 10/16/2002 | 19:17:24 | 14 | 106 | F |
LAST,FIRST | | | 10/16/2002 | 19:16:01 | 1 | 13 | F |
LAST,FIRST | | | 10/16/2002 | 18:50:34 | 13 | 113 | F |
LAST,FIRST | | | 10/16/2002 | 13:55:49 | 5 | 52 | F |
LAST,FIRST | 12345789-1... | | 10/16/2002 | 13:12:58 | 3 | 79 |
LAST,FIRST | 289262968 | | 10/16/2002 | 12:23:47 | 2 | 2 |
LAST,FIRST | | | 10/16/2002 | 11:22:33 | 1 | 1 |
LAST,FIRST | 1256 | | 10/16/2002 | 08:09:39 | 1 | 1 | T |
LAST,FIRST | 123457890-... | | 10/14/2002 | 18:49:35 | 1 | 6 |
LAST,FIRST | 123457890- | | 10/14/2002 | 18:08:17 | 3 | 215 |
Destination 1
None
Destination 2
None
Send Selected Studies
Networking Queue
Make Patient Anonymous
Query/Retrieve
Archive to Local CD-RW
Tagged
Processed
Annotated
Delete Selected Patients
Disk:
The system is ready for user input.
5371 Remaining
SELECT THE ARCHIVE TO LOCAL CD–RW BUTTON

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2-10Emergency Recovery

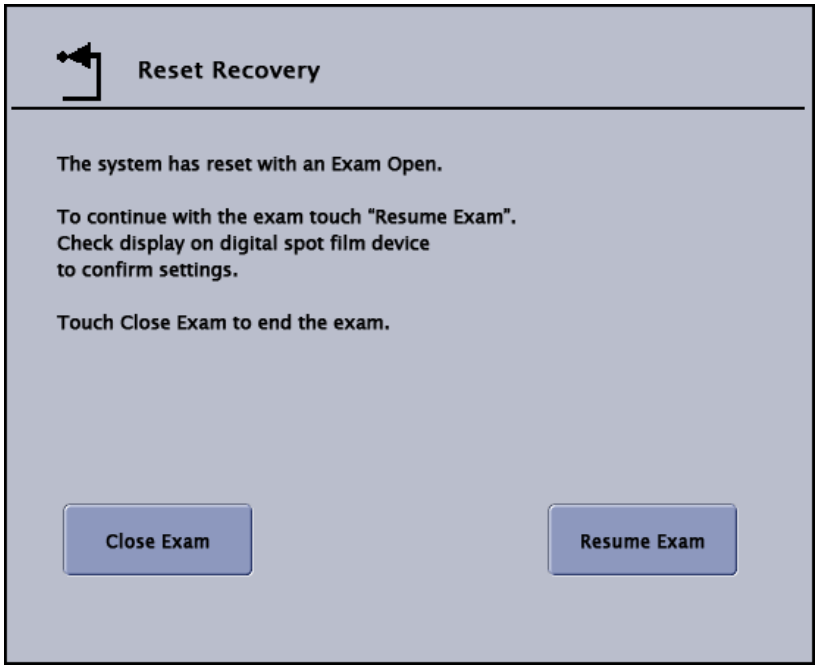
If during a procedure power is lost to the system, the system will reboot if power is returned to the unit after 30 seconds.

NOTE: Upon reboot, the system will remember all patient parameters if power was lost during a procedure. If power is off longer than 30 seconds, the system must be rebooted by pressing the Power On button located on the RCIM. The study will not resume. Re-select the patient from the Patient list and the exam.

WARNING

IF THE SYSTEM CONTROL INTEGRATED CONSOLE LOSES COMMUNICATION WITH THE REMAINING SYSTEM DURING A DIGITAL RECORD ACQUISITION, THE USER WILL BE ALLOWED TO CONTINUE/FINISH (EXPOSURE SWITCH IS RELEASED) THE ACQUISITION. ANY SUBSEQUENT ACQUISITION (FLUORO OR DIGITAL) WILL BE INHIBITED.

ILLUSTRATION 5-23
RESET RECOVERY SCREEN


Reset Recovery
The system has reset with an Exam Open.
To continue with the exam touch "Resume Exam".
Check display on digital spot film device
to confirm settings.
Touch Close Exam to end the exam.
Close Exam
Resume Exam

The system will then give the options for continuing the study by selecting **Resume Exam** or ending the study by the **Close Exam** option.

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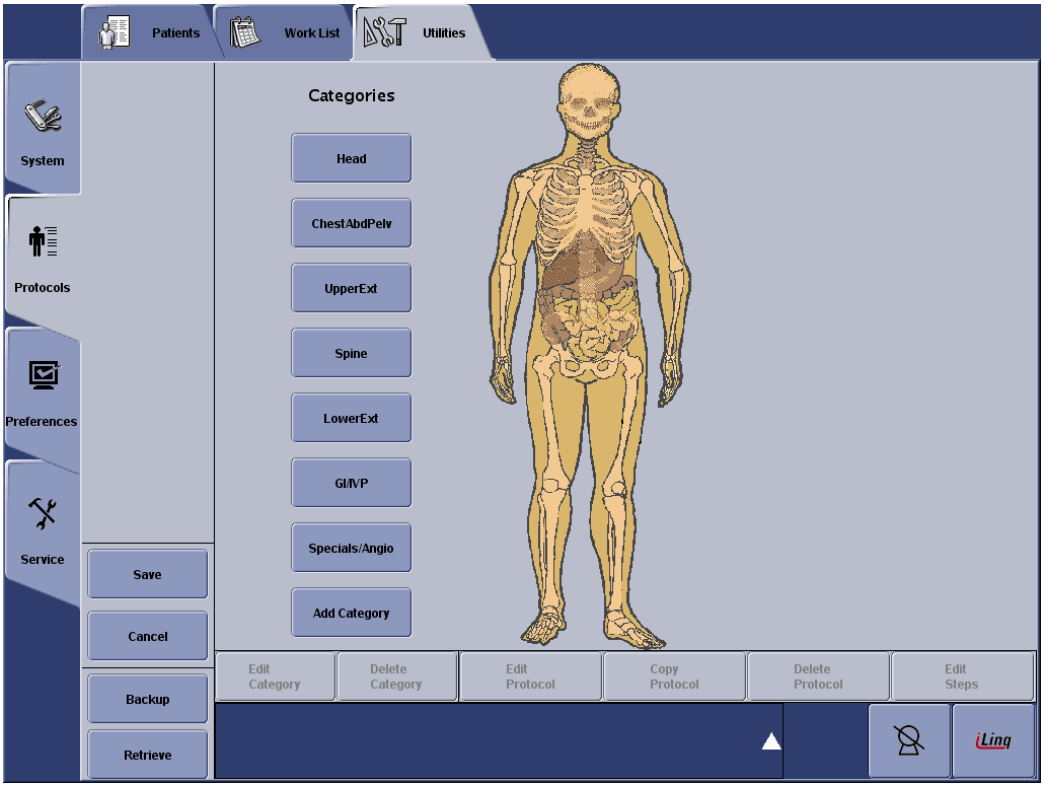
SECTION 3
EDIT PROTOCOLS

3-1Protocol Editor

The Protocol Editor is entered by selecting the Protocols tab at the left of the Utilities screen. The Protocol Editor is a tool for the creation, modification, and deletion of Protocol Categories and Protocols.

ILLUSTRATION 5-24
PROTOCOL EDITOR SCREEN



If access to the Protocol Editor is denied, the Protocol Editor will display a pop– up window as shown below:

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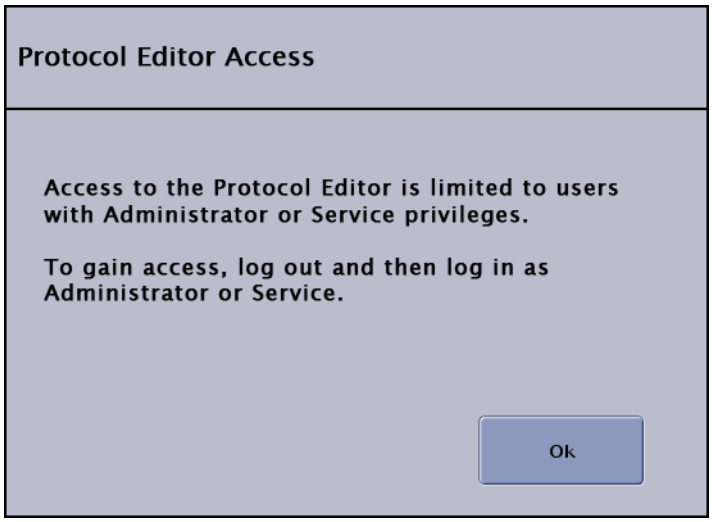
ILLUSTRATION 5-25
PROTOCOL EDITOR


Protocol Editor Access
Access to the Protocol Editor is limited to users with Administrator or Service privileges.
To gain access, log out and then log in as Administrator or Service.
Ok

Select **Protocols**, then **Edit** to add protocols to your system or to modify an existing one.

After adjustments have been made and the data for the protocols saved. The total protocol data can be archived to CD by selecting **Backup**. (It is always advisable to maintain a record of data and changes as a backup file.)

If data is lost, insert the backup CD and select **Retrieve**. All previous data is returned to the system.

3-2Protocols

The protocol database stores technique information for commonly performed exams. The user needs only to select a procedure from the database, and the system will set up the technique information according to the selected procedure. This section describes the structure of the database.

Protocol Category: At the top level is Protocol Categories. The Protocol Category names are defined by the user. 8 Protocol Categories can be created.

Protocol: Within a Protocol Category Protocols are defined. The Protocol names are defined by the user. The Protocol is intended to be defined at the exam level (e.g. Spine, or Upper GI), rather than by specific views. 16 Protocols per Protocol Category can be created.

Protocol Step: Within a Protocol, Steps are defined. The Protocol Step names are defined by the user. The Protocol Step is typically defined at the view level (e.g. Lateral Chest, or Scout for Upper GI). 6 Protocol Steps per Protocol can be created.

For each Protocol Step, the user is able to define whether it supports Tube 1 (Digital Record and Fluoro) or Tube 2 (RAD) and the corresponding technique parameters.

The protocol database file stored on the system has the capacity to store up to 4000 individual operator defined protocols.

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The protocol database file is stored in the same location on the system as the other system log files.

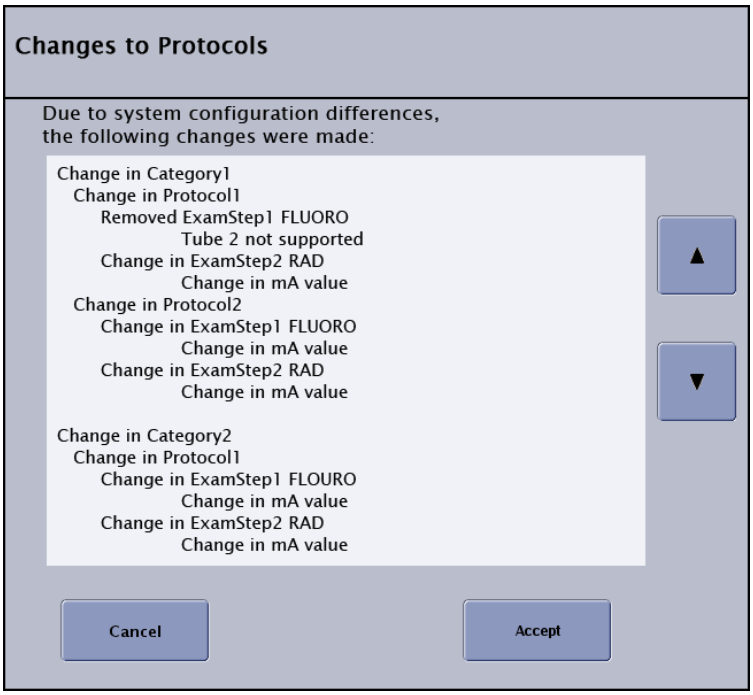
CAUTION

When loading the default protocols the user must select the correct Protocol CD-Rom.

The system will warn the user that specific protocols have had modifications made to them. The user must be aware of any user-defined protocols before accepting installation of any Protocol CD-Roms during Protocol Retrieve. Refer to ILLUSTRATION 5-26.

If protocols have been modified, and a "Default" CD is used to restore system configuration, all of the user-defined protocols will be deleted and must be redefined.

ILLUSTRATION 5-26
CHANGES TO PROTOCOLS



3-2-1 Parameters for Tube 1 (Fluoro) Protocol Step

For the Tube 1 Protocol Step, there is only one Receptor and there is no Patient Size. An initial EPT (Estimated Patient Thickness) is used, with the contrast media selected. The initial EPT is used for the first exposure and then subsequent exposures use the Patient Size calculated by exposure management. The initial or default EPT is hard coded in system software.

For the Tube 1 Protocol Step, the technique parameters that is defined by the user for digital record are: Contrast Media, AEC / Angio, and Record Frame Rate. If Angio, then Sub / No Sub is also defined. The technique parameters that is

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defined by the user for fluoro are: FOV, Horizontal Sweep, Vertical Sweep, Fluoro Frame Rate, and ROI.

Technique specification for both fluoro and digital record should be made with the grid in the beam.

The default digital record technique is:
- 110 kV
- 200 mA
- Small Focal Spot

The default fluoro technique is:
- 85 kV
- Small Focal Spot

3-2-2 Parameters for Tube 2 (RAD) Protocol Step

For each Tube 2 Protocol Step, the user is able to define technique parameters for up to three different Receptors. The Receptor choices are wall bucky, table bucky, and tabletop.

For wall bucky and table bucky, the user is able to define either AEC, Fixed, or both. If both are chosen, the user is able to define the default. For table top, the user is limited to Fixed.

For each Receptor defined, the user is able to define technique parameters for up to four different Patient Sizes. (S, M, L and PED)

For each Receptor — AEC / Fixed — Patient Size combination defined, the technique parameters that is defined by the user are: kV, mA, Focal Spot, Film Speed Screen and Spectral Filter. If Fixed, then the mAs is also defined. If AEC, then the Ion Chamber, Estimated mSec and the Density is also be defined.

The user is able to define the default Patient Size, Receptor, and AEC / Fixed.

The default AEC technique is:
- 75 kV
- 400 mA
- center AEC cell

The default Fixed technique is:
- 50 kV
- 100 mA
- 25 mAs
- Small focal spot

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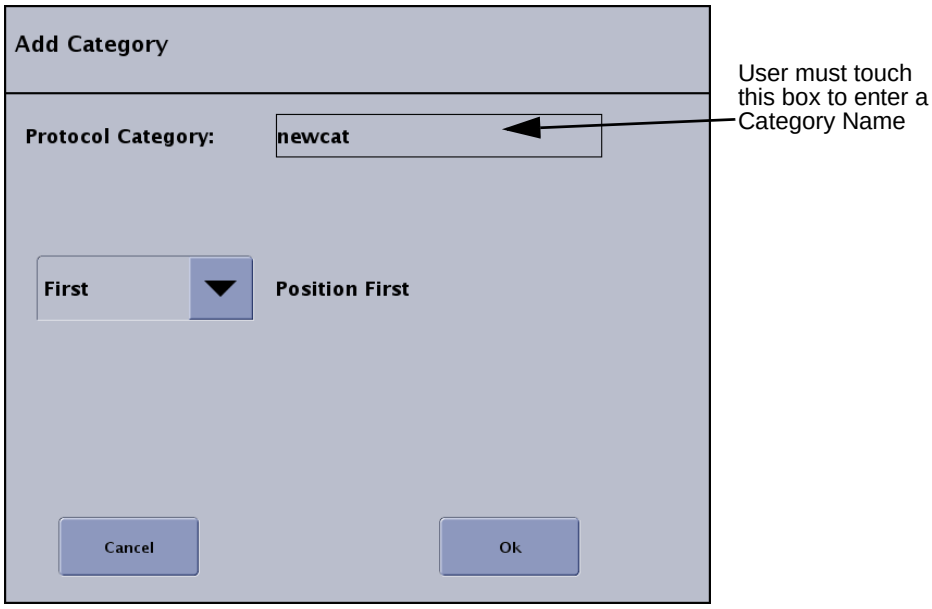
Add Category

When Add Category is selected, the pop–up window appears as shown below:

ILLUSTRATION 5-27
ADD CATEGORY



The user is able to name the new Protocol Category. The length of the name is limited to 12 characters. When the pop–up appears, the text field is blank.

When the user is adding the first Protocol Category, the selection reads “First” and the control grayed out / inactive. Otherwise the selection reads “After Y” where Y is the last Protocol Category in the list. All categories are listed in creation order or user-defined order in the drop down menu.

When the user selects OK, the pop–up window closes. The Add Category button moves down one slot to accommodate the new Protocol Category button.

NOTICE

User must physically touch “Protocol Category” box in order to type in a name.

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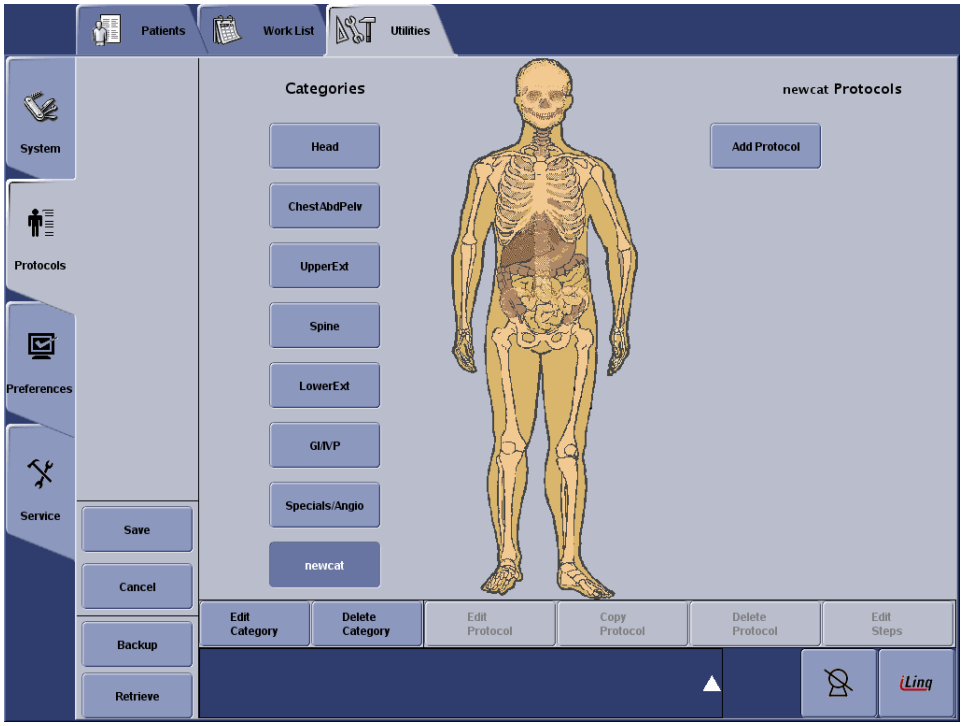
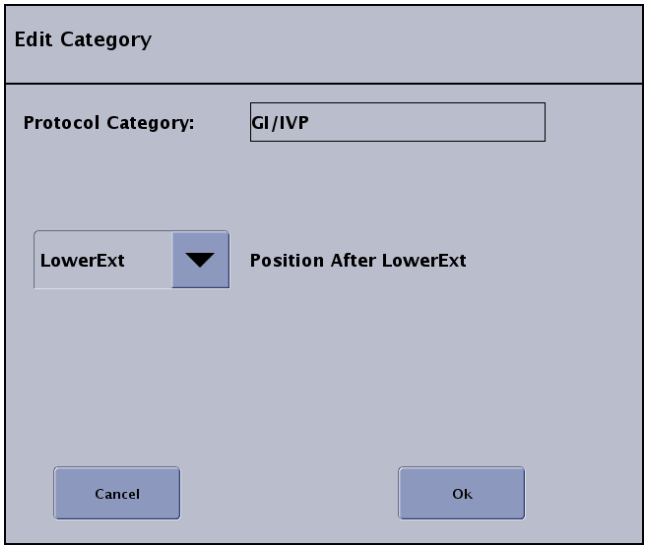
ILLUSTRATION 5-28
ADD CATEGORY SCREEN



Edit Category

When Edit Category is selected, a pop–up window appears as shown below:

ILLUSTRATION 5-29
EDIT CATEGORY



The currently selected Protocol Category appears and the user is able to change the name, it's position, or both.

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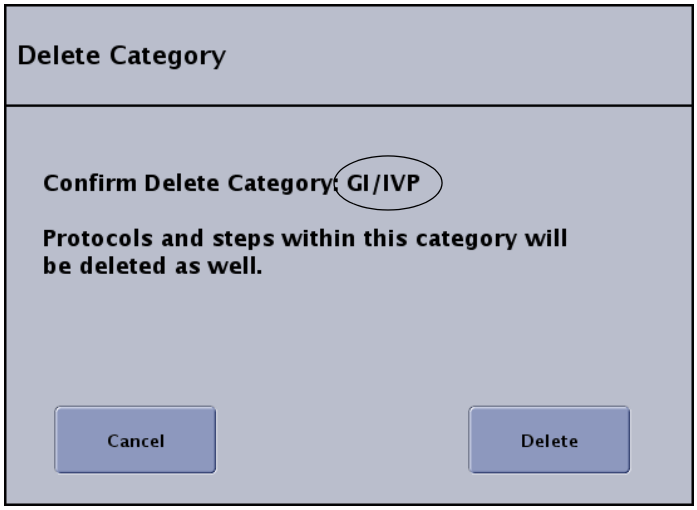
To change position of a category, select the drop down menu and select the Protocol category to be moved. A Protocol category can be positioned first or at any other position within the complete list of Protocol categories.

NOTE: It is necessary to SAVE after changes have been made. Select OK will temporarily save the changes made. Upon exiting from Protocol Editor, a final save or cancel confirmation will ensure any changes made will be saved.

Delete Category

When Delete Category is selected a pop–up window appears as shown below:

ILLUSTRATION 5-30
DELETE CATEGORY



The name of the currently selected Protocol Category appears.

3-2-4 Protocols

Only one Protocol is able to be selected at a time. When the user selects a Protocol, the new Protocol button depresses. If a Protocol had been selected prior to the new Protocol being selected, the original Protocol button is released. This behavior is different from the Select Protocols screen where multiple Protocols can be selected simultaneously. The Protocol selections are greyed out/inactive until a Protocol is selected.

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Edit Protocol

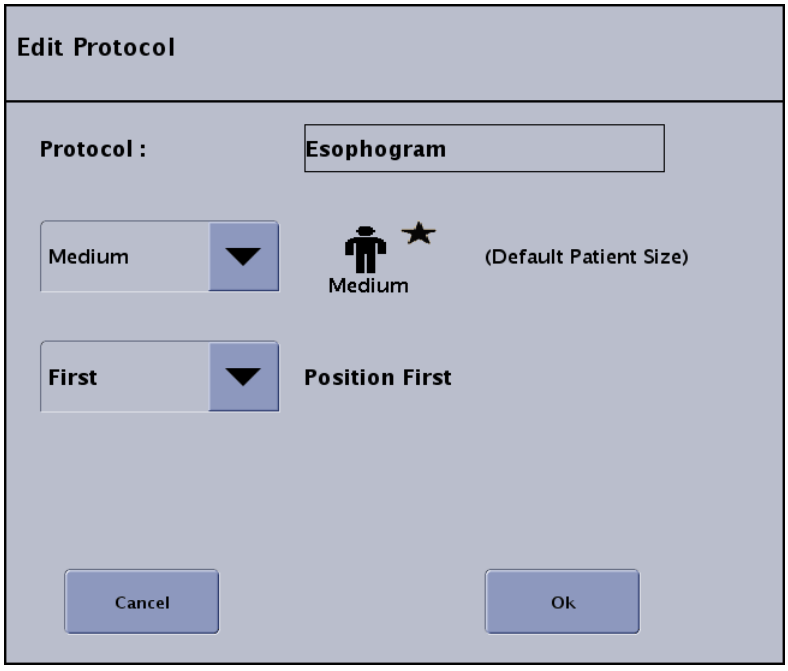
When Edit Protocol is selected, a pop–up window appears. The pop–up window is identical to the Add Protocol window.

The name of the currently selected Protocol appears and the user is able to change it. The current default Patient Size appears and the user is able to change it. The placement of the currently selected Protocol appears and the user is able to change it. The choice “After X”, where X is the name of the currently selected Protocol, not available.

When the user selects OK, the pop–up closes, the screen transitions to the Protocol Editor screen.

When the user selects Cancel, the pop–up window closes.

ILLUSTRATION 5-31
EDIT PROTOCOL



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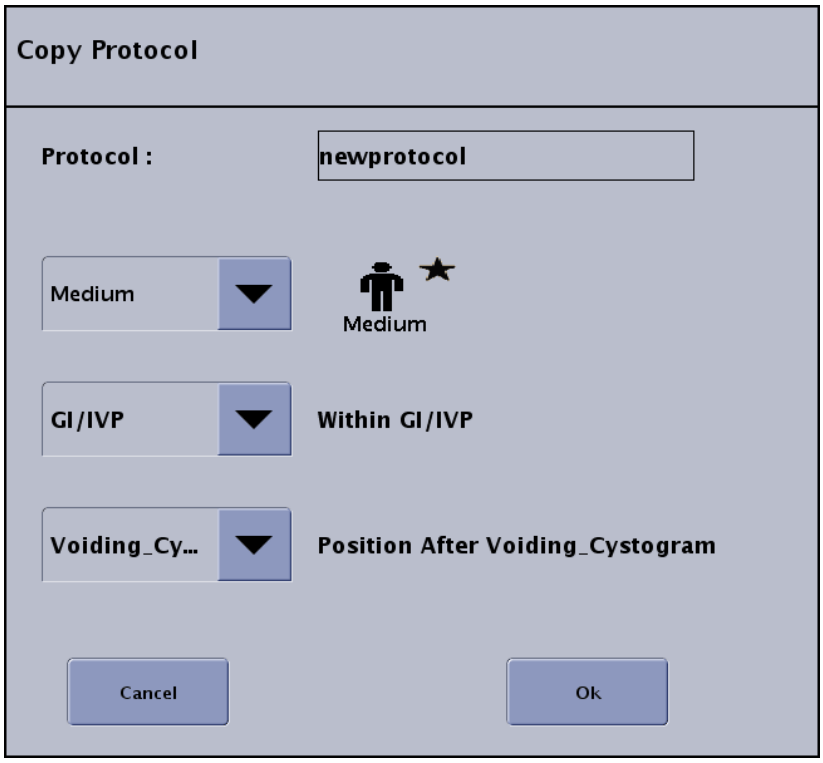
Copy Protocol

When Copy Protocol is selected, a pop–up window appears as shown below:

ILLUSTRATION 5-32
COPY PROTOCOL



The text “Default Patient Size” is included after the patient size icon to clarify what the field is for.

The text “Position (After)” is included after the location drop down to clarify what the field is for.

The text “Within Category Name” is included after the category drop down to clarify what the field is for.

The user is able to name the new Protocol. The length of the name is limited to 12 characters. When the pop–up appears, the text field is blank.

The current default Patient Size appears and the user is able to change it.

The currently selected Protocol Category appears and the user is able to change it. If only one Protocol Category is available, the control is grayed out / inactive.

The user is able to place the new Protocol. The Protocol being copied can be named and placed in the same category or a different category. When the user is adding the first Protocol in a Protocol Category, the selection reads “First” and the control is grayed out / inactive. All categories are listed in creation order or user-defined order in the drop down menu.

The “OK” button will be grayed out / inactive until valid entries have been made.

When the user selects OK, the pop–up closes, the new protocol is added to the protocols in the position designated in the pop–up and it is selected.

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When the user selects Cancel, the pop–up window closes.

The Copy Protocol button is grayed out / inactive when no Protocol has been selected or 16 protocols exist for the current category.

Delete Protocol

When Delete Protocol is selected, a pop–up window appears.

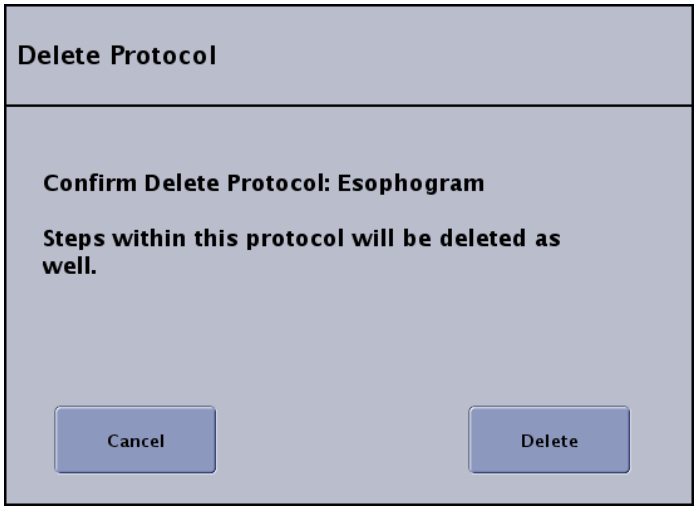
The name of the currently selected Protocol appears.

When the user selects Delete, the pop–up window closes. The selected Protocol button disappears and the Add Protocol button is moved up one slot. When the Add Protocol button is not on the screen because the limit of Protocols has been reached, the Add Protocol button reappears in the last slot.

When the user selects Cancel, the pop–up window closes.

The Delete Protocol button is grayed out / inactive if no Protocol has been selected.

ILLUSTRATION 5-33
DELETE PROTOCOL



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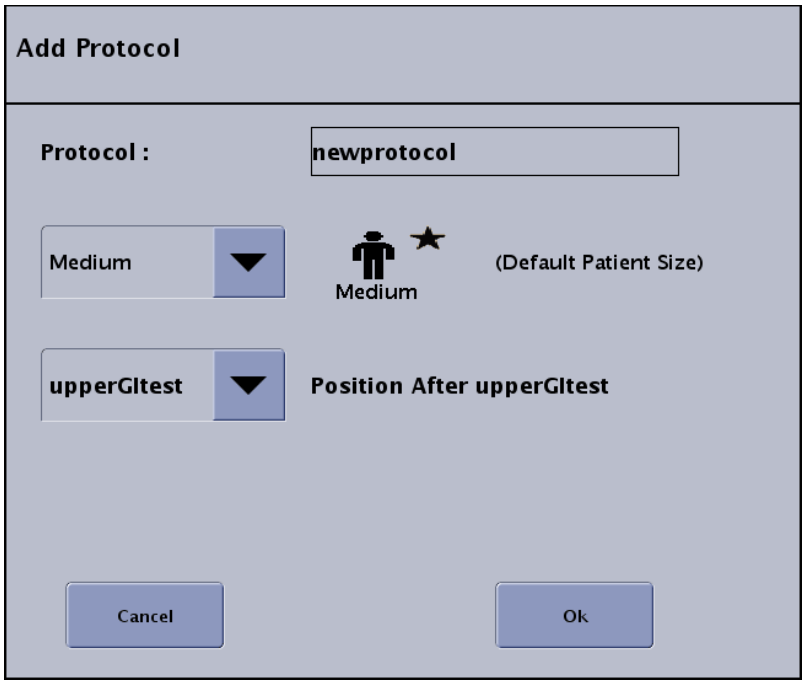
Add Protocol

When Add Protocol is selected, a pop–up window appears as shown below:

ILLUSTRATION 5-34
ADD PROTOCOL



The user is able to name the new Protocol. Select the box in order to enter the Protocol name. The length of the name is limited to 12 characters.

Select Patient Size for Patient Default size. S, M, L and PED.

The user is able to place where the protocol should be positioned in the category list.

“Position (After)” is included above the location drop down to clarify what the field is for.

The star and the text “Default Patient Size” is included after the patient size icon to verify what the selected default Patient Size is.

The user is able to set the default Patient Size. This Patient Size is used as the default for all Tube 2 Protocol Steps. The benefit of having this parameter at the Protocol level is that if the Patient Size has to be changed (say from Medium to Ped [pediatric]), it only has to be changed in one place and not in each Protocol Step. When the pop–up appears, the default factory Patient Size is set to Medium.

The user is able to place the new Protocol in any position. When the user is adding the 1st Protocol, the selection is read “First” and the control is grayed out / inactive. All categories are listed in creation order or user-defined order in the drop down menu.

The “OK” button will be grayed out / inactive until valid entries have been made.

When the user selects OK, the pop–up is closed and the new protocol is added to the right of the main screen and selected.

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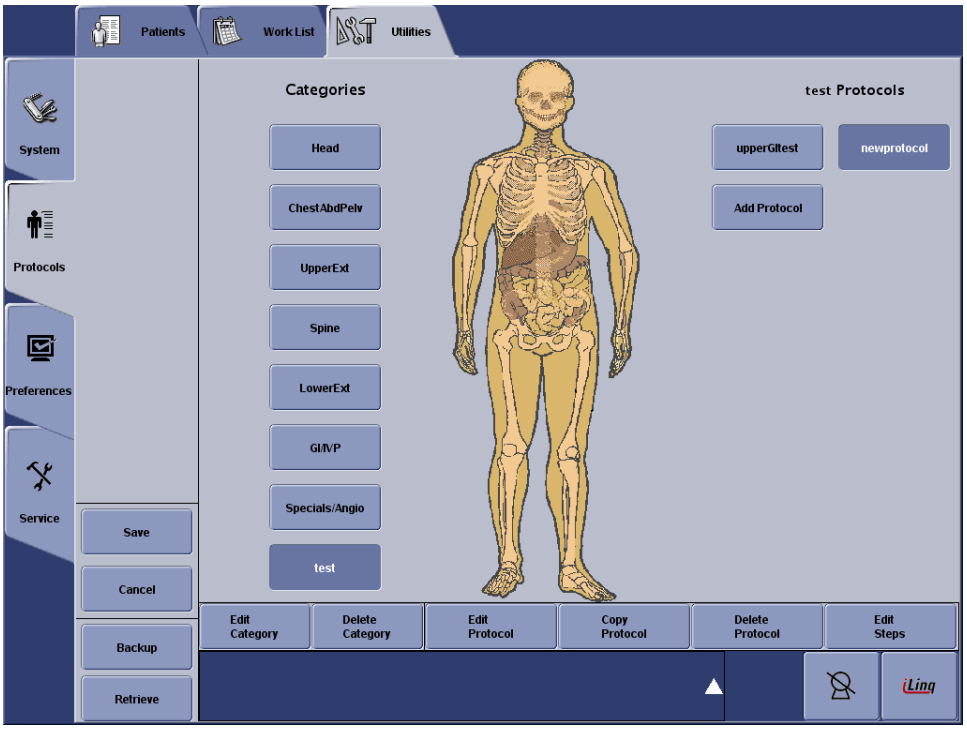
ILLUSTRATION 5-35
ADD PROTOCOL SCREEN



After the new protocol has been added, Protocol Steps must be selected.

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Protocol Steps Button

An Edit Steps button is provided at the bottom of the main screen. When no protocols are selected the button is grayed out. When a protocol is selected the button becomes available and will no longer be grayed out. When the Edit Steps button is selected, the Protocol Steps screen appears.

If you are adding a new Protocol, the information portion of the screen will be blank until you select Add Step, shown in ILLUSTRATION 5-36.

If you are editing steps for an existing or copied protocol, the tube selection screen appears, shown in ILLUSTRATION 5-37.

ILLUSTRATION 5-36
ADD STEP SCREEN - new protocol

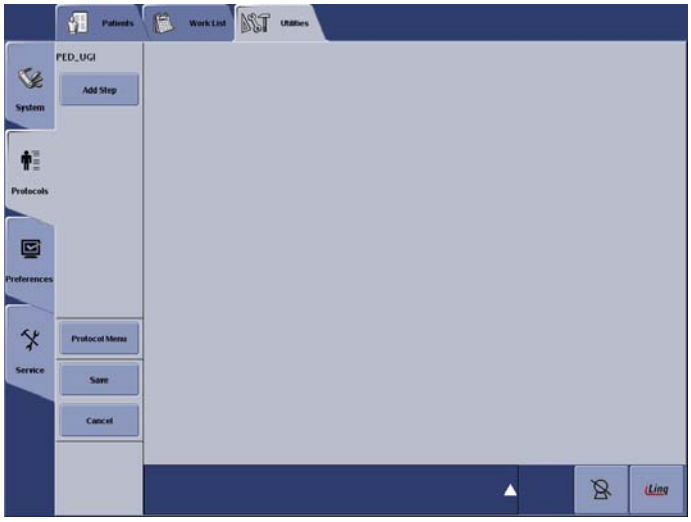
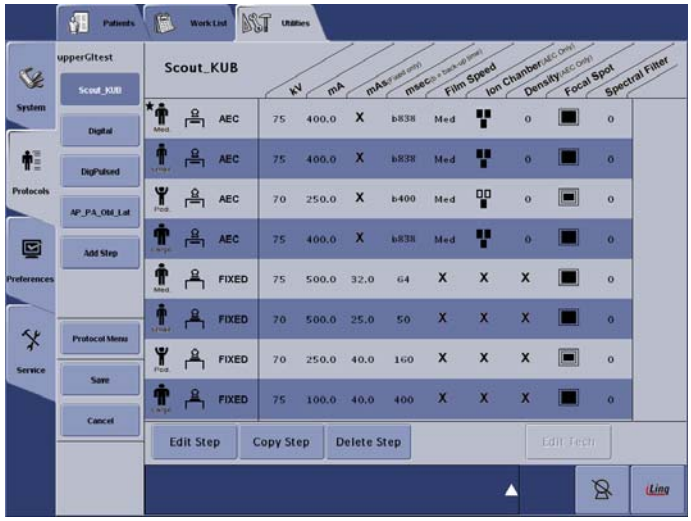


ILLUSTRATION 5-37
ADD STEP SCREEN - existing or copied protocol



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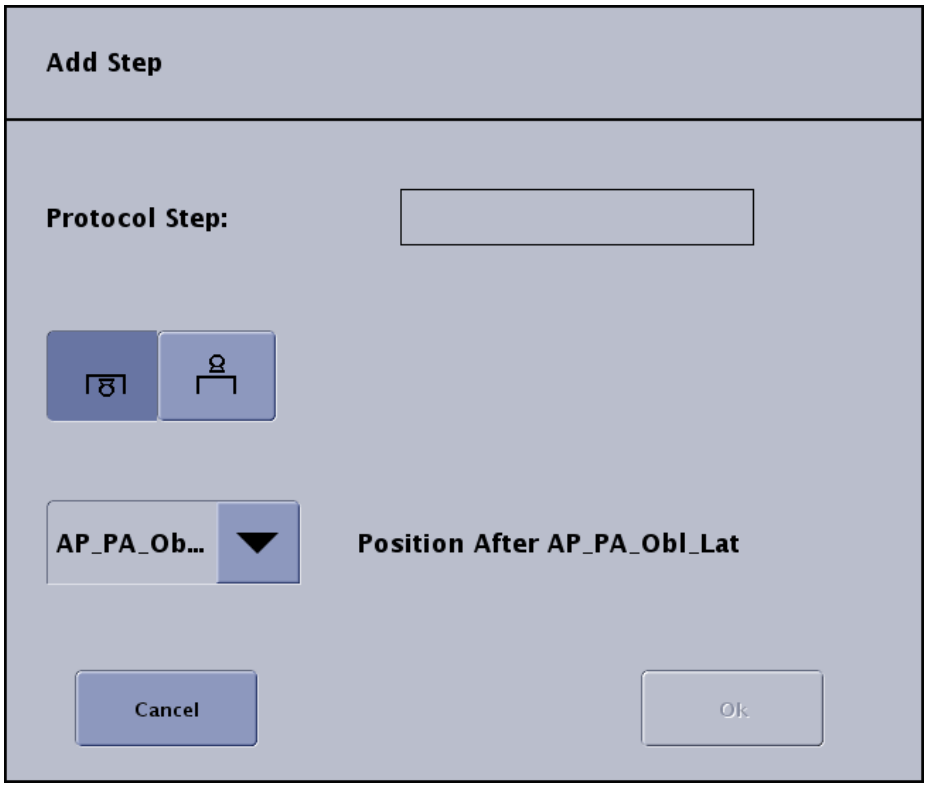
3-2-5 Protocol Steps

Add Step

When Add Step is selected, a pop–up window appears.

After Add Step is selected, the step must be named and the tube selected.

ILLUSTRATION 5-38
NAMING THE STEP AND SELECTING THE TUBE



The user is able to name the new Protocol Step. The length of the name is limited to 10 characters. When the pop–up appears, the text field is blank. Duplicate step names will not be allowed

The user is able to pick a tube, either Tube 1 or Tube 2.

If the system only has Tube 1, the selection for the different tubes will not be shown.

If a tube is available but no receptors are configured for that tube, the tube will not be shown.

The user is able to place the new Protocol Step. When the user is adding the first Protocol Step, the selection reads “First” and the control is grayed out / inactive. All categories are listed in creation order or user-defined order in the drop down menu The complete list of selections will show the first Protocol Step name and the last Protocol Step name.

The text “Position (After)” is included above the location drop down to clarify what the field is for.

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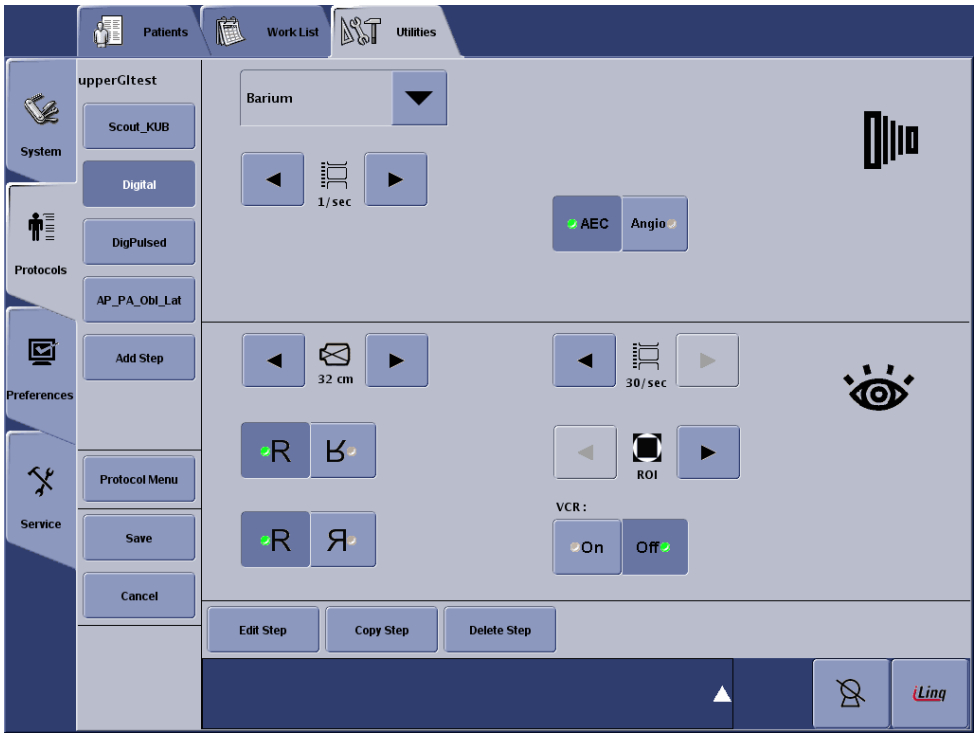
The “OK” button will be grayed out/inactive until valid entries have been made.

ILLUSTRATION 5-39
TUBE 1 EDIT



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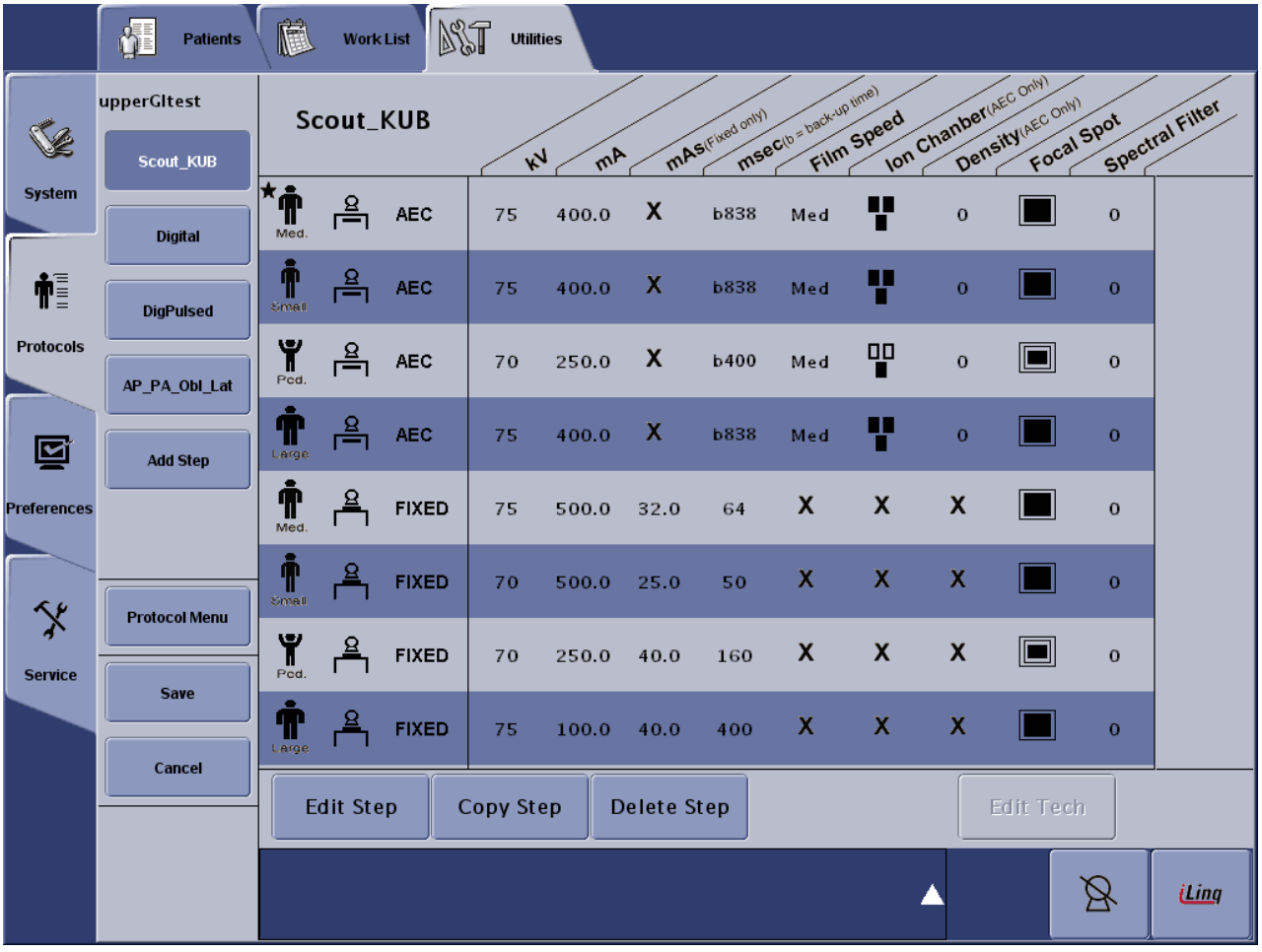
Tube 2
Add Step

NOTE: When building and modifying steps in your Protocols, it is important to remember your Protocol routine and the order the steps are placed in the Protocol. As a benefit, the Tube Bucky button on the IDD will move in descending order through the Tube 2 steps. If you have the Pulsed Fluoro option, the digital button on the IDD not only will return you to fluoro from a Tube 2 step but can toggle you between continuous and pulsed fluoro.

If you are modifying a Protocol the screen will appear with the Tube selection for the first step in that Protocol.

ILLUSTRATION 5-40
TUBE SELECTION SCREEN



To modify a specific Tube 2 technique, touch the row you wish to change and press Edit Tech.

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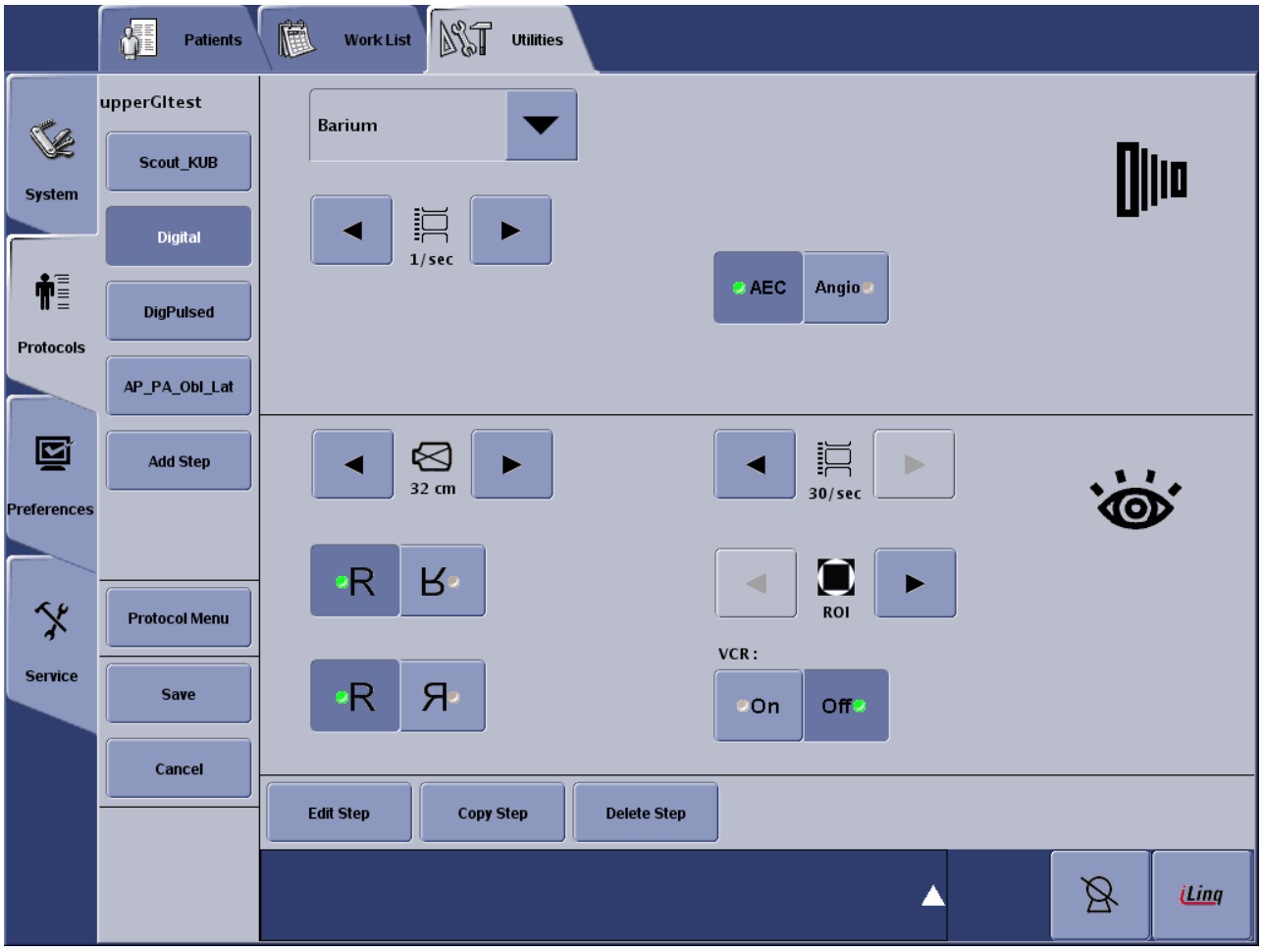
ILLUSTRATION 5-41
TUBE 1 EDIT



To add an Angio Step, select Tube 1 and Angio instead of AEC.

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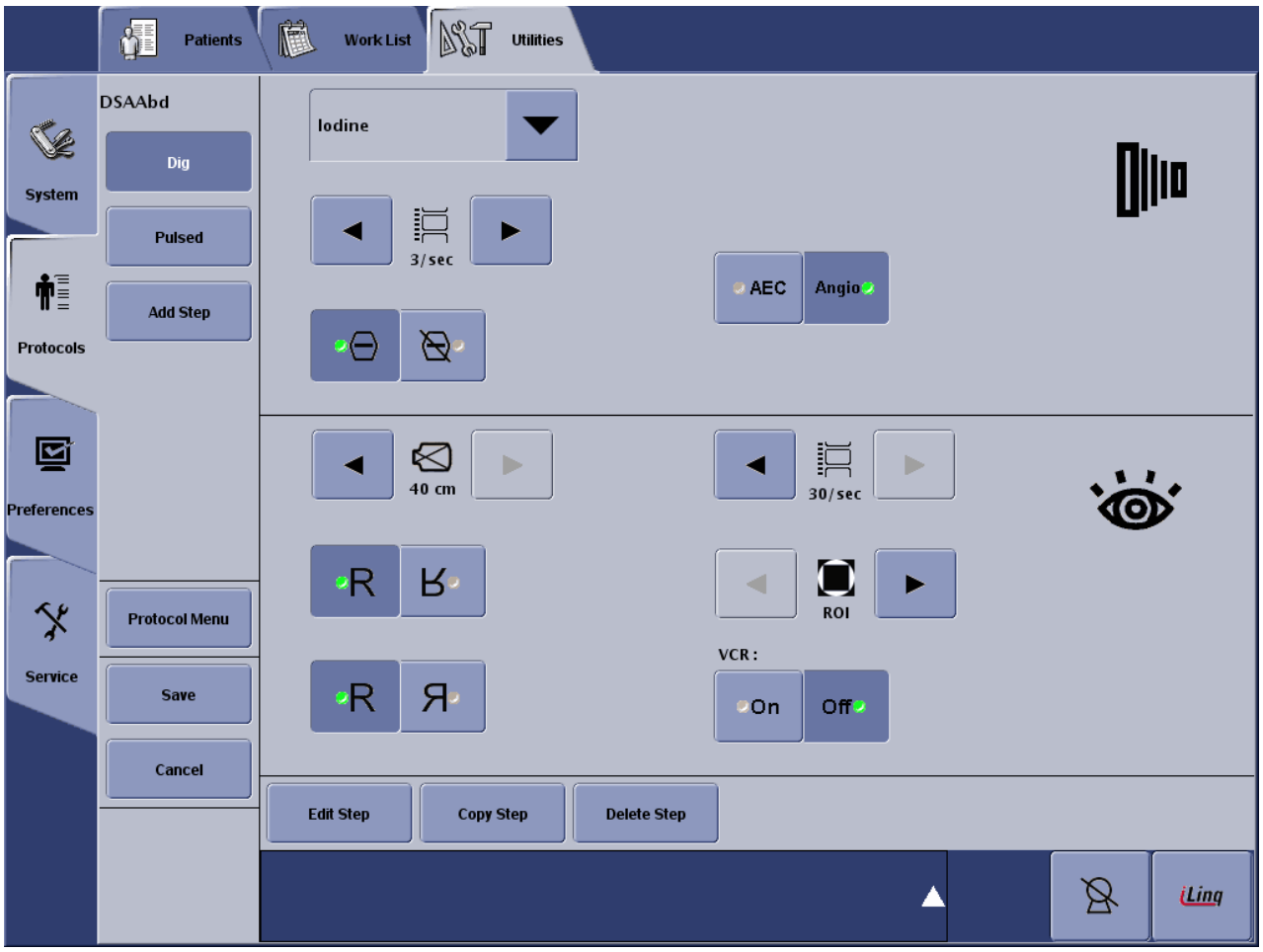
ILLUSTRATION 5-42
ANGIO STEP



- The difference between AEC and Angio: with AEC the exposure factures are adjusted per each image in a multiple frame series. With an Angio multiple frame acquisition, the system will adjust the technical factors at the start of the series and after the adjustment, maintains it as a fixed technique for the completion of the series.
- The Edit, Copy and Delete Step procedures can be completed now. When utilizing the Copy Step function, the procedure can be named but only placed in the same protocol.

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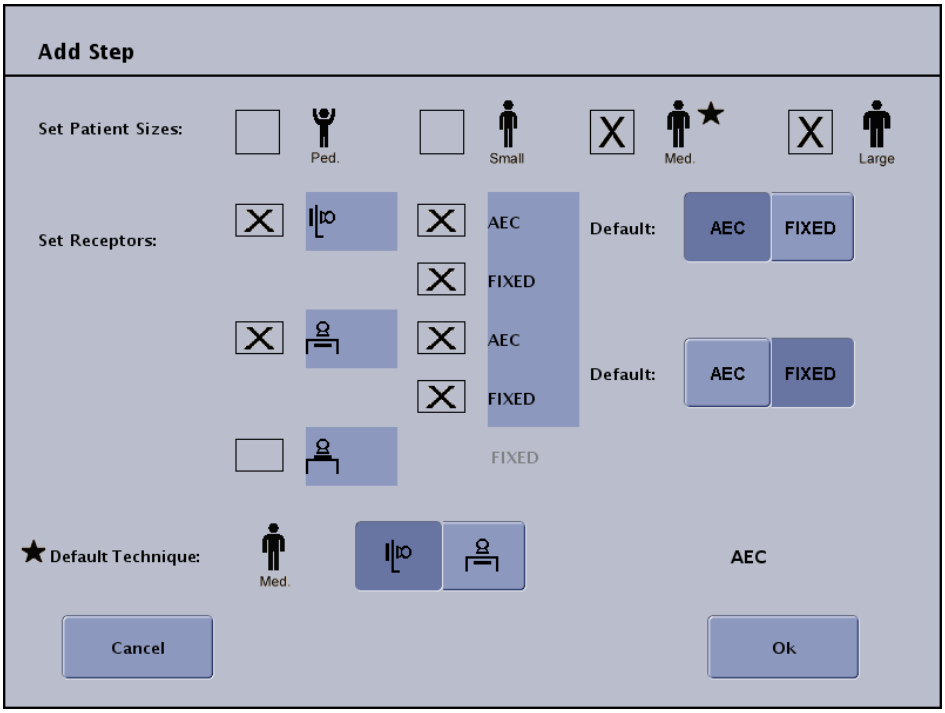
When Tube 2 and OK have been selected on the Add Step screen, a pop–up window appears as shown below:

ILLUSTRATION 5-43
ADD STEP SCREEN



The user is able to set the available Patient Sizes. The default Patient Size that was chosen at the Protocol level is checked and indicated with a star. The default Patient Size will not be able to be de–selected.

The user is able to set the available Receptors. Until a Receptor is selected, its AEC and Fixed selections are grayed out / inactive.

Until both AEC and Fixed have been selected for a given Receptor, the Default AEC / Fixed toggle are set to AEC.

When a Receptor is chosen, all AEC and Fixed options for that receptor appears in Acquire. When the user is in Acquire and changes the AEC / Fixed selection to something that has not been chosen in the Protocol Editor, the technique is set to the appropriate default technique, either AEC or Fixed. For the table top Receptor, only Fixed appears since no AEC exists.

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Tube 2
Technique
Edit Review

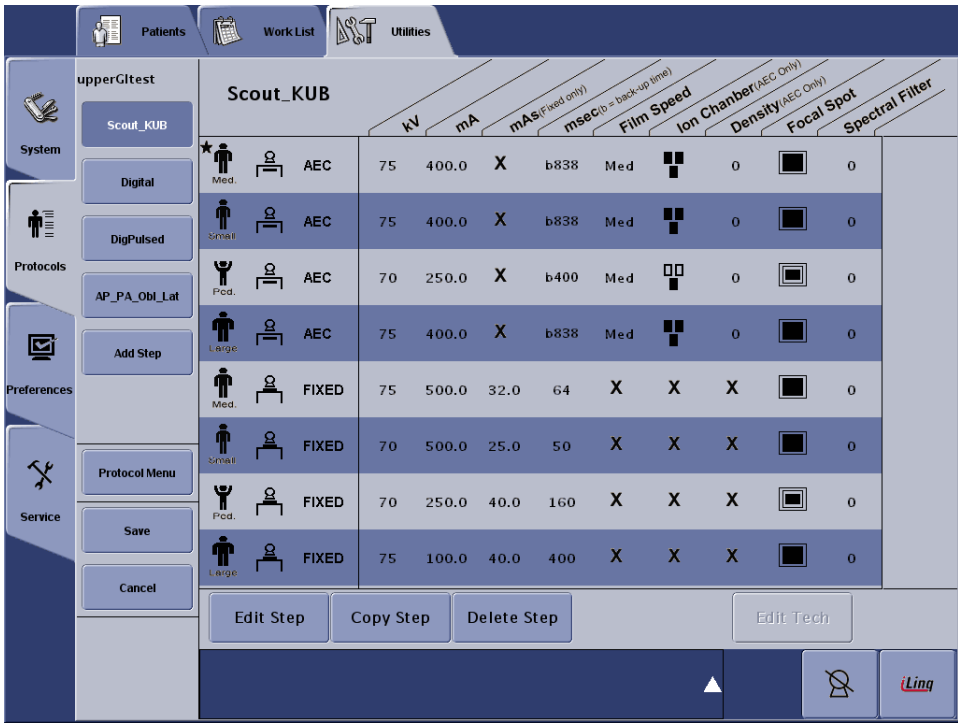
When a Tube 2 Protocol Step has been selected, the screen appears as shown below:

All combinations of the previously selected Patient Size, Receptor, and AEC / Fixed appears down the left side of the table.

The default technique now is indicated with a star just to the left of its Patient Size.

The user is able to select a particular technique (row) and select the “Edit Tech” button. This will allow the user to edit that technique.

ILLUSTRATION 5-44
TUBE 2 PROTOCOL STEP SCREEN



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Tube 2
Technique
Edit

After selecting the “Edit Tech” button, the selected technique (row) will be shown in the upper left of the main area.

For each technique the user will be able to adjust the following values.

- kV
- mA
- Film Speed / Screen (AEC only)
- Spectral Filter
- Ion Chamber (AEC only)
- Focal Spot
- Density (AEC only)
- Estimated mSec (AEC only)
- mSec (Fixed only)

The “Estimated (m)Sec” text appears within an AEC technique. For a fixed technique the text is removed along with the controls and values for Ion Chamber and Density.

The Film Speed/Screen toggle allows the user to select a default from up to three possible options: The options are set up and defined in the Service User Interface.

The “Estimated (m)Sec” controls allows the user to put in an estimate of how much time (mSec) it will take to acquire the image for each technique. The back–up time used on RAD AEC acquire screens will be based on this value. Backup time is calculated as 1.5* the AEC time estimate.

The review step button returns the user to the Technique Edit Review screen.

The “Prev. Tech.” and “Next Tech.” buttons bring up the previous or next operation mode in the sequence.

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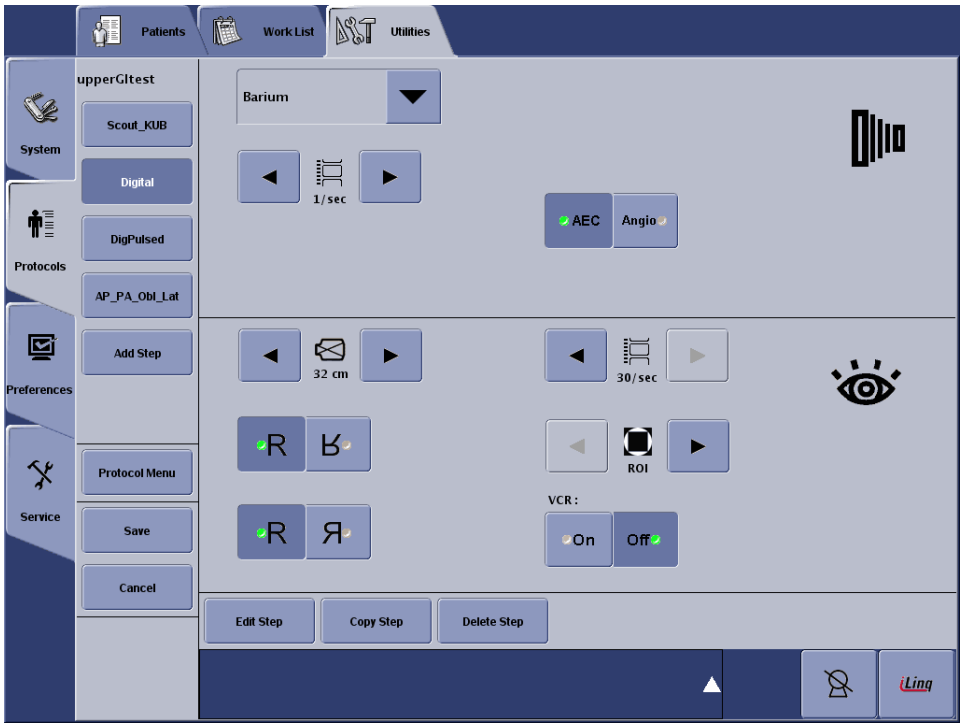
Tube 1
Technique
Edit

When a Tube 1 Protocol Step has been selected, the screen appears as shown below:

ILLUSTRATION 5-45
TUBE 1 PROTOCOL STEP SCREEN



All of the record technique parameters appears above the top row of the table. All of the fluoro technique parameters appears above the bottom row of the table.

The user has the option to select between AEC and Angio (DSA)

When Angio is selected the subtraction buttons appears.

The user has the option to select from the available Contrast.

The user has the option to select from available Digital record rates by selecting the left and right arrows.

For Fluoro, the user has the ability to select Fluoro rate by selecting the left and right arrows.

For Fluoro the user has the ability to select vertical and horizontal flip.

When the user is adding a Protocol Step, the Tube 1 Technique Edit screen starts with information for Digital Record and Fluoro settings filled in with the default techniques.

The user has the ability to select between 6 different Region of Interests (ROI).

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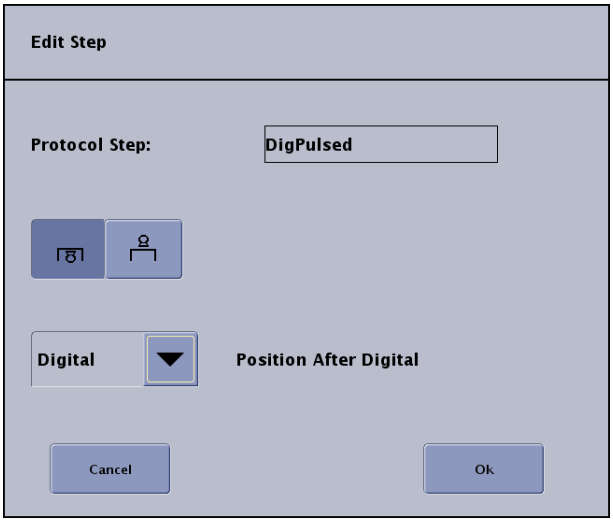
The name of the Protocol appears as text above the column of Protocol Step buttons on the left side of the work space.

Edit Step

When Edit Step is selected, a pop–up window appears.

ILLUSTRATION 5-46
EDIT STEP



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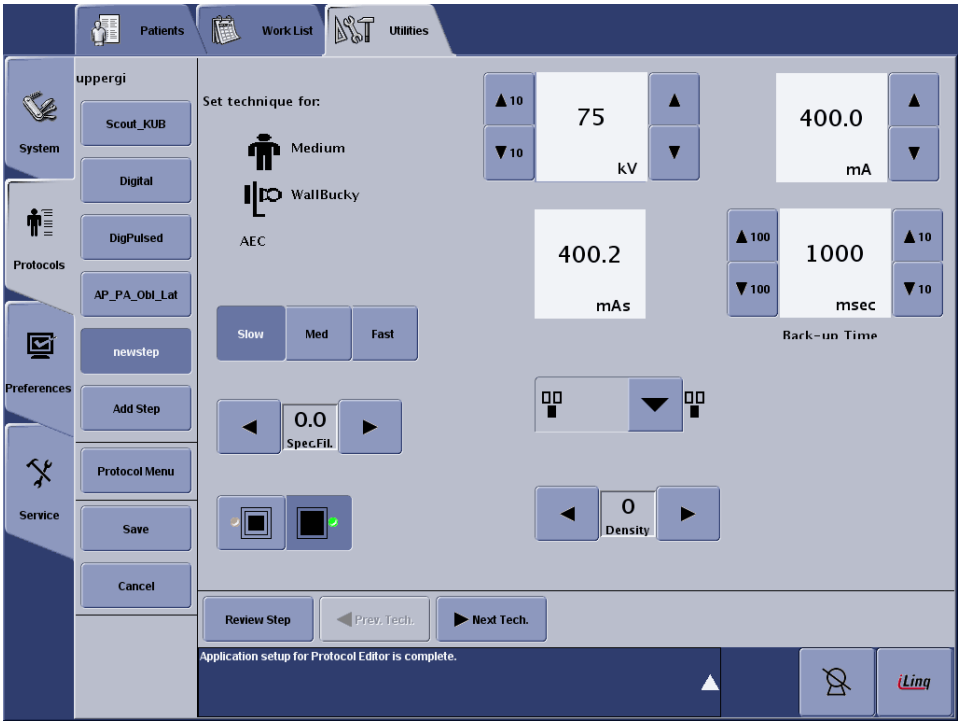
Tube 2 Edit Step

ILLUSTRATION 5-47
TUBE 2 EDIT STEP SCREEN



When the user selects either Tube 1 or Tube 2 and OK, the screen changes to the Tube 2 Edit Step screen.

- The user is able to select “OK” without making any changes.
- The user is able to uncheck receptors and patient sizes (except for the default). When the user selects “OK”, the screen transitions to the Technique Review screen displaying all the previously selected operation modes and their user–defined values.
- The user is able to check any previously unchecked receptors and patient sizes. When the user selects “OK”, the screen transitions to the Technique Review screen displaying all the previously selected operation modes and their user–defined values.
- The user is able to change the default receptor settings with out disturbing any of the previously selected operation modes and their user–defined values.

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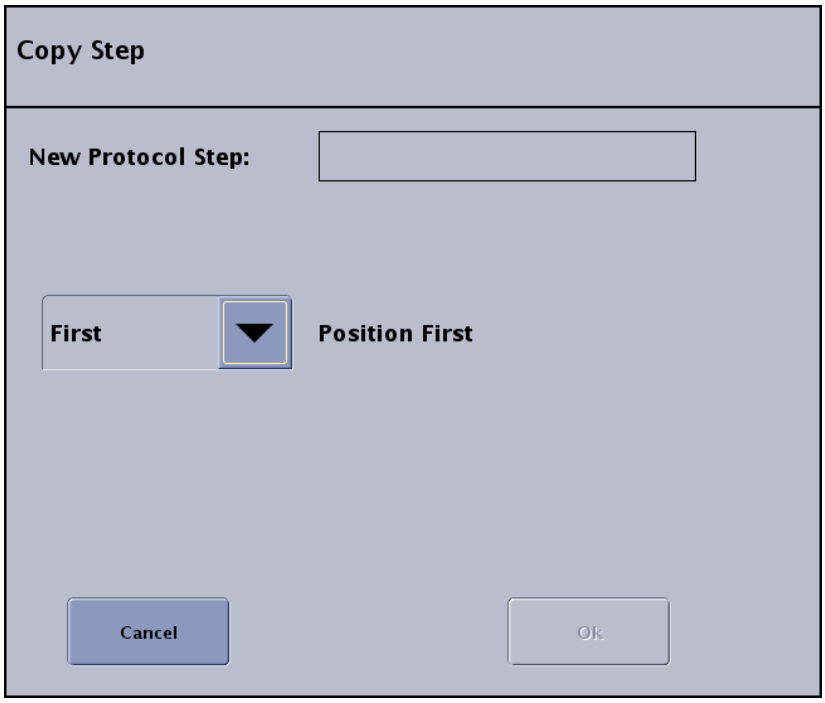
Copy Setup

When Copy Step is selected a pop–up window appears as shown below:

ILLUSTRATION 5-48
COPY STEP



The user is able to name the new Protocol Step. The length of the name is limited to 10 characters.

When the user selects OK, the screen changes to the Technique Edit screen for the new Protocol Step.

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Delete Setup

When Delete Step is selected, a pop–up window appears.

ILLUSTRATION 5-49
DELETE STEP

The name of the currently selected Protocol Step appears.

When the user selects Delete, the selected Protocol Step button disappears and the Add Step button moves up one slot.

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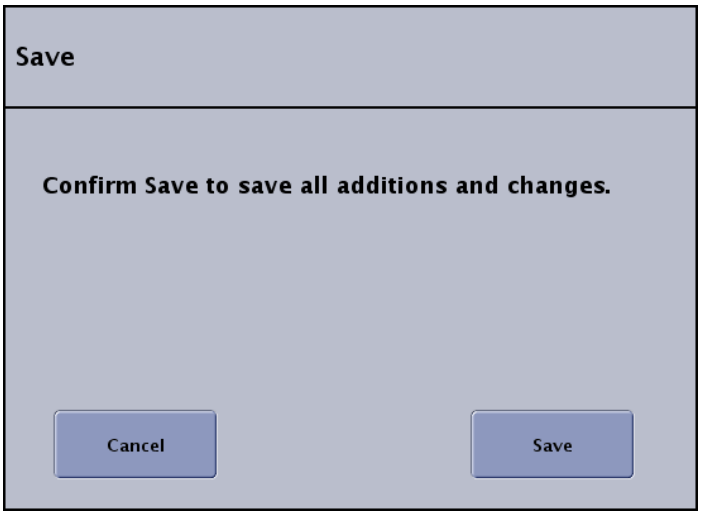
Save When Save is selected a pop–up window appears as shown below:

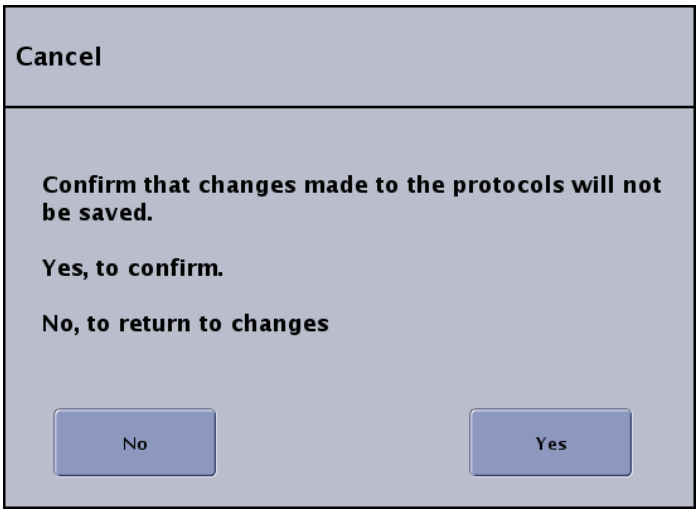
ILLUSTRATION 5-50
SAVE POP-UP WINDOW



When the user selects Save the protocol database is updated with any additions and changes.

Cancel When Cancel is selected a pop–up window appears as shown below:

ILLUSTRATION 5-51
CANCEL POP-UP WINDOW



When the user selects YES, the screen changes to the Protocol Editor screen and no changes will be made to the protocol database. The screen goes to the main Protocol Editor screen with no categories selected.

NOTE: It is recommended that the SAVE button be selected periodically while making modifications in the Protocol Editor. If the system crashes, any changes that have not been saved will be lost.

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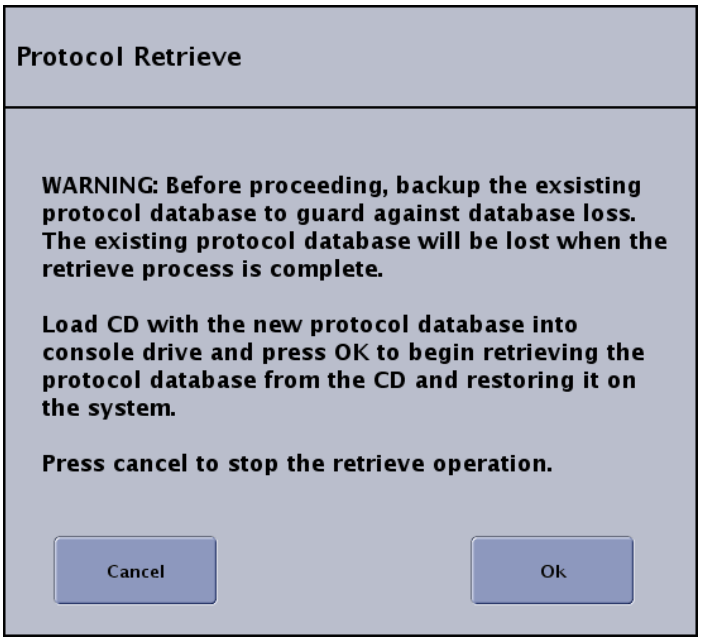
3-2-6 Retrieve

When Retrieve is selected a pop–up window appears. This function allows the user to retrieve a protocol database that has been saved onto a CD.

ILLUSTRATION 5-52
PROTOCOL RETRIEVE


Protocol Retrieve
WARNING: Before proceeding, backup the exsisting protocol database to guard against database loss. The existing protocol database will be lost when the retrieve process is complete.
Load CD with the new protocol database into console drive and press OK to begin retrieving the protocol database from the CD and restoring it on the system.
Press cancel to stop the retrieve operation.
Cancel
Ok

When the Protocol Retrieve begins, the system looks for a protocol database on the CD that corresponds with the system configuration.

NOTE: Initiating a Retrieve causes changes in the protocol database only. No other areas of the system (i.e. system configuration) is affected.

NOTE: Each retrieved Protocol is checked for compatibility with the system configuration.

When a retrieved Protocol is found to be incompatible, the technique parameters are modified by the system to create a valid technique. In the case of a tube not being available the technique is removed. If it is a smaller x–ray tube the system will drop the mA value. If the system is not configured for pulse fluoro and a protocol being retrieved has pulse fluoro the fluoro rate is changed to continuous.

At the end of the retrieve the user is notified of the changes made to the new database. The user then is able to accept or reject any of the changes. When the user selects “Accept” the new database replaces the existing one. If the user chooses “Cancel” the old database remains. Refer to the following screen illustration.

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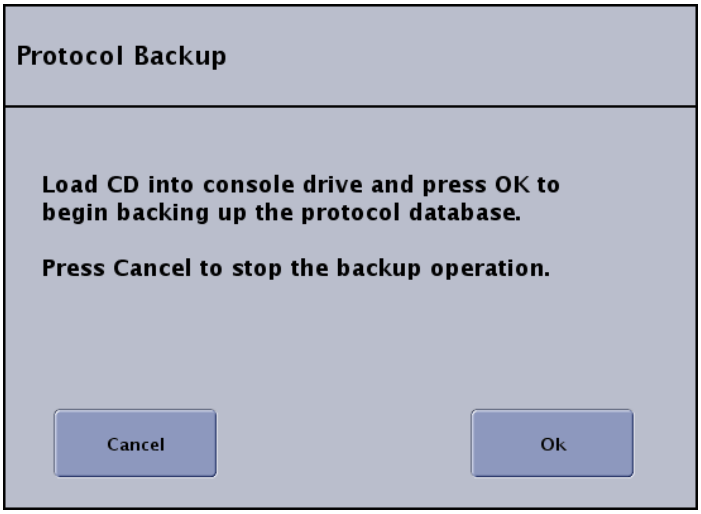
3-2-7 Back Up

When Back Up is selected a pop–up window appears The pop–up window allows the user to back up the protocol database and the system configuration data.

ILLUSTRATION 5-53
BACK UP


Protocol Backup
Load CD into console drive and press OK to begin backing up the protocol database.
Press Cancel to stop the backup operation.
Cancel
Ok

The protocol database and the system configuration data is backed up onto a single CD.

When the user selects “OK”, the Back Up begins.

Before the Back Up begins a check of the available space on the CD media is done to verify that the database will fit on the CD.

NOTE: If an error is detected during the backup process, an error is generated and logged in the system error log indicating the database backup process failed.

3-2-8 System Configuration Changes

Before the system configuration is changed, the protocol database must be backed up onto a CD.

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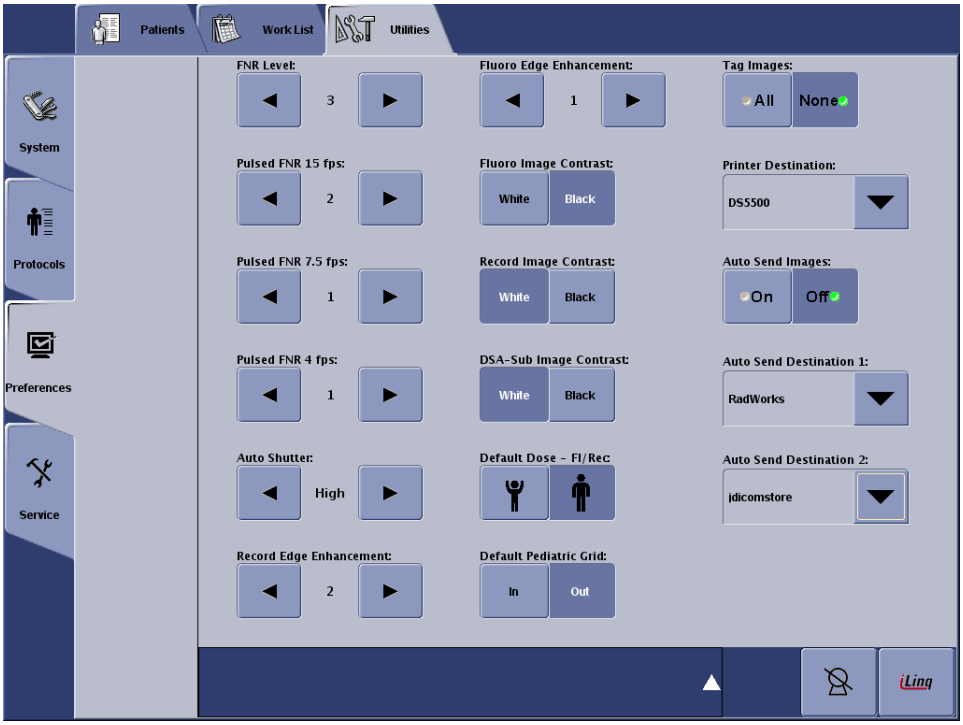
3-3User Preferences

Below the Utilities tab and within the Preferences tab the screen below appears:

ILLUSTRATION 5-54
USER PREFERENCE SCREEN



The user has the ability to set the default values for all the functions listed.

The values set at this screen are used within the Patient Select, Acquire and View/Film screens.

3-3-1 Default Dose - Fl/Rec

The default dose can be set to either Pediatric or Adult - this setting is used each time a digital record exam is started. The user can also change the dose during the exam at either the IUI or at the IDD console.

3-3-2 Default Pediatric Grid

The default grid position can be configured to be in or out when the Pediatric dose is selected. The user can also change the grid position during the exam at the IDD console.

3-3-3 DSA Image Invert

DSA Image Invert can be set to W/B or B/W (White on Black, Black on White). When performing DSA acquisition images will be acquired and displayed at the default setting.

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3-3-4 Record Image Invert

Record Image Invert can be set to W/B or B/W (White on Black, Black on White).. When performing record, images will be recorded and displayed according to the default setting.

3-3-5 Fluoro Image Invert

Fluoro Image Invert can be set to W/B or B/W (White on Black, Black on White). When performing fluoro, images will be acquired and displayed according to the default setting.

3-3-6 Auto Send

Auto Send can be set to default to On or Off. This will be the default setting on the acquire and view film screens.

3-3-7 FNR Level

FNR can be set to default to: None, 1, 2, 3, 4, 5, 6. When acquiring images, FNR will be applied at the selected default level.

The default FNR setting is site configurable. FNR is modifiable from the IDD. Any changes to FNR from the tower continues until a new patient is selected. When a new patient is selected, FNR is reset to the default setting.

3-3-8 Record Edge Enhancement

Record Edge Enhancement can be set to default to: None, 1, 2, 3, 4. When acquiring images, Record Edge Enhancement will be applied at the selected default level.

The default record edge filter for acquisition is site configurable. Changing the record edge filter from the GoldOne in View / Film should not affect the acquisition setting.

3-3-9 Fluoro Edge Enhancement

Fluoro Edge Enhancement can be set to default to: None, 1, 2, 3, 4. When acquiring images, Fluoro Edge Enhancement is applied at the selected default level.

The default fluoro edge filter for acquisition is site configurable. Changing the fluoro edge filter from the GoldOne in View / Film should not affect the acquisition setting.

3-3-10 Printer Destination

Printer Destination appears in a drop down list with all available printers. When the user chooses to print, this is the printer to which the images will be sent. Available printers will be configured in the system configuration.

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3-3-11 Auto Send Destination

Auto Send Destination appears in a drop down list with all available destinations. When the user chooses “Send Images” or Closes a patient file when “Auto Send” is checked, the images are transferred to the destination selected here. Available destinations will be configured in the system configuration.

3-3-12 Images Tagged

Images Tagged can be set to default to All or None. When “All” is selected, Images will automatically be tagged when entering the View/Film screen.

3-4Service User Interface / Effect on IUI

3-4-1 Dose Measurement

(Yes, No) If set to “no,” Total Dose and DAP (including their titles) do not appear on IUI. If “yes” Total Dose and DAP (including their titles) appears on IUI.

3-4-2 Pulsed Fluoro

(Yes, No) If set to “no,” only Continuous Fluoro is available and selection for Fluoro rate is removed from IUI screens. If set to “yes” all options are available to the user.

3-4-3 DSA Package

(Yes, No) If set to “no” DSA steps are not available for use or able to be set up in Prot Edit.

3-4-4 DICOM Ethernet

(Yes, No) If set to “no” the system is not set up to send images to other stations, Auto–send and Auto–send destinations are not available in user preferences.

3-4-5 DICOM Print

(Yes, No) If set to “no,” the system is not set up to print.

3-4-6 DICOM Worklist

(Yes, No) If set to “no” the tab for worklist does not appear. If set to “yes” the tab for worklist is displayed.

3-4-7 Pediatric Option

(Yes, No) If set to "no", the system Pediatric mode is not available. The Default Dose and Default Pediatric Grid buttons are not displayed in the User Preferences.

3-4-8 Measurement System

(English, Metric) Display all measurements according to the selection. This includes FOV/Magnification.

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3-4-9 HU Tone Alert / %HU

This is the Heat Units Remaining level at which the tone is sounded. This is only followed when VA Site is set to “yes.”

3-4-10 Number of Tubes

(1,2) When set to “1,” only the under table tube is available, all references to Tube 2 are removed.

3-4-11 OTS

(Yes, No) When set to “yes,” table bucky and table top are available however, the number of tubes must be set to 2.

3-4-12 Wallstand Location

When set to “0”, wall bucky will not be an option as a receptor.

3-4-13 Fluoro Rates

(Continuous = 30, Pulsed = 15, 7.5, 4) These are set values and are options depending if Pulsed Fluoro is set to yes or no.

3-4-14 Spot Rates

(Single, 1, 2, 3, 4, 5, 6, 7.5) Available record rates.

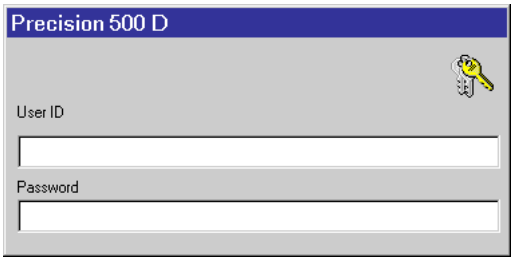
3-4-15 Max Record rate

(7.5) Fastest record rate

3-4-16 System Log On

(Yes, No) When set to “yes” the system will require user to log on. If set to “no” the Log out button is not displayed on the utilities screen.

ILLUSTRATION 5-55
SYSTEM LOG-IN



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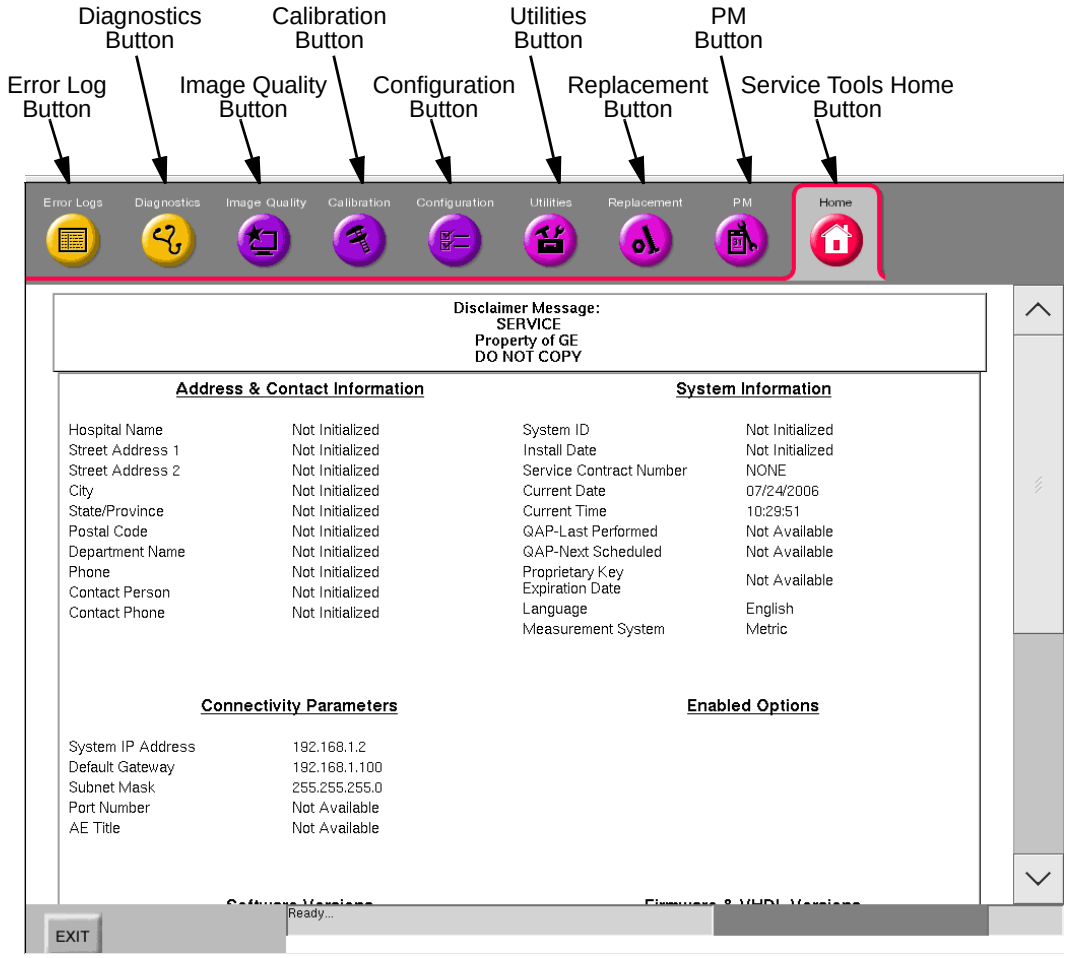
3-5Service Tab

These screens are for utilization by the field service engineers.

ILLUSTRATION 5-56
SERVICE SCREEN



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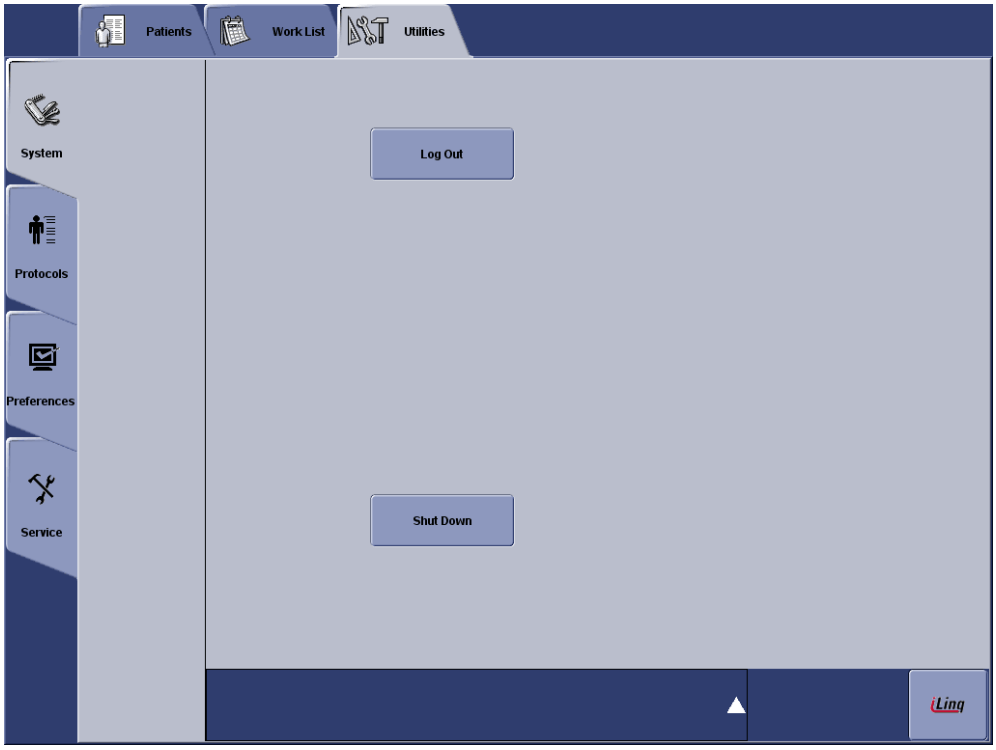
3-6System Shutdown

The Log out button is utilized to end your session on the equipment The next staff member will insert their security password to now operate the system. After selecting log out a confirmation is requested.

ILLUSTRATION 5-57
LOG OUT SCREEN



After this confirmation you are logged out of the system.

Shutdown removes power from the entire unit.

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ILLUSTRATION 5-58
SHUTDOWN SCREEN

If a requested function has not been completed before a shutdown is requested a warning message will be displayed with the option of completing the shutdown.

SECTION 4
IN–ROOM REMOTE KEYPAD (OPTION)

The In–Room (IR) Remote Keypad is an option intended for control of review functions from the procedure room. It consists of a hand–held infrared remote control and receiver unit. Its functions closely follows the functions of the IR console keypad.

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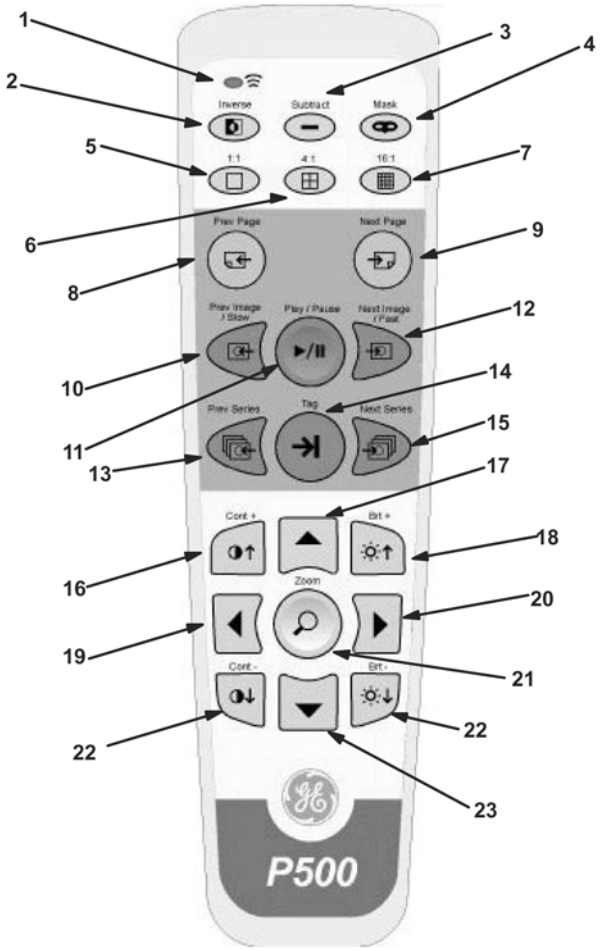
4-1IR Remote Keypad Commands

ILLUSTRATION 5-59
IR REMOTE KEYPAD COMMANDS

Key

1. LED Display
2. Inverse
3. Subtract
4. Mask
5. 1 on 1 format
6. 4 on 1 format
7. 16 on1 format
8. Prev Page (only if operational if in 4/1 or 16/1)
9. Next Page (only if operational if in 4/1 or 16/1)
10. Prev Image/Slow*
11. Play/Pause*
12. Next Image/Fast*
13. Previous Series
14. Tag
15. Next Series
16. Increase Contrast
17. Roam Up
18. Increase Brightness
19. Roam Left
20. Roam Right
21. Zoom
22. Decrease Contrast
23. Roam Down
24. Decrease Brightness



* Dual Function: Slow/Fast plays thru loop of images at a slower or faster rate.

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CHAPTER 6
DIGITAL IMAGING SYSTEM

SECTION 1
MENU DISPLAYS

1-1Digital Image Main Screen

The Digital Image Review screen appears once an acquisition session is beginning.

The review screen side menu allows for some Image manipulation and enhancement from the Digital Imaging Station.

ILLUSTRATION 6-1
DIGITAL IMAGE REVIEW SCREEN

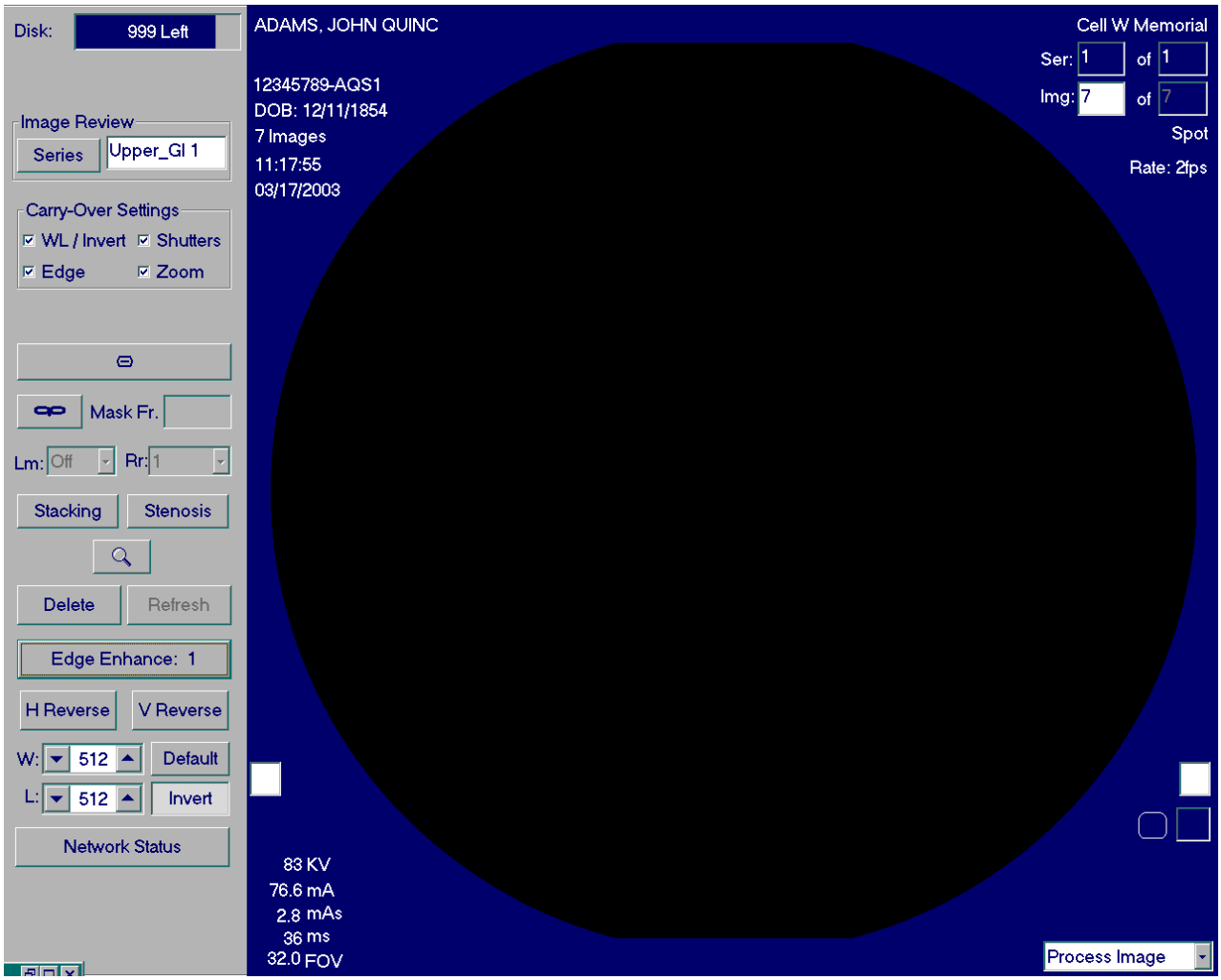

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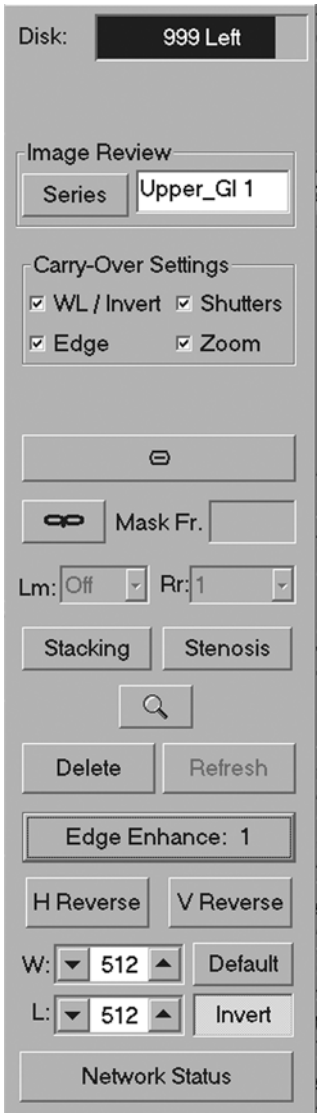
ILLUSTRATION 6-2
IMAGE REVIEW UTILITY MENU



Pull Down List

Pull–down list buttons, when activated, show all the available settings for a feature. You can use the pointing device to select one of the options shown in the list. The feature will not allow any other entries other than those included in the list.

Input Field Boxes

Input Field Boxes include a box for entering exact data using the keyboard.

Toggle Buttons

Toggle feature buttons activate/deactivate a feature with each selection of the feature button. The button changes in appearance to signal if the feature is active.

Arrow Buttons

Arrow buttons can point either up, down, left, or right. Selecting an arrow button once will change the specific feature by a single value. For example, the Select Run Arrow pointing to the right (shown here) will advance the system to the next Run.

1-2Disk Space Indicators

The disk space indicators are shown at the top of the feature menu portion of the screen.
Disk = Hard Disk space for Fluoro and Spot images

The shaded area on the scale indicates the amount of space already used for storing images.

ILLUSTRATION 6-3
DISK STATUS INDICATOR

The number indicates how many images can be stored to disk.

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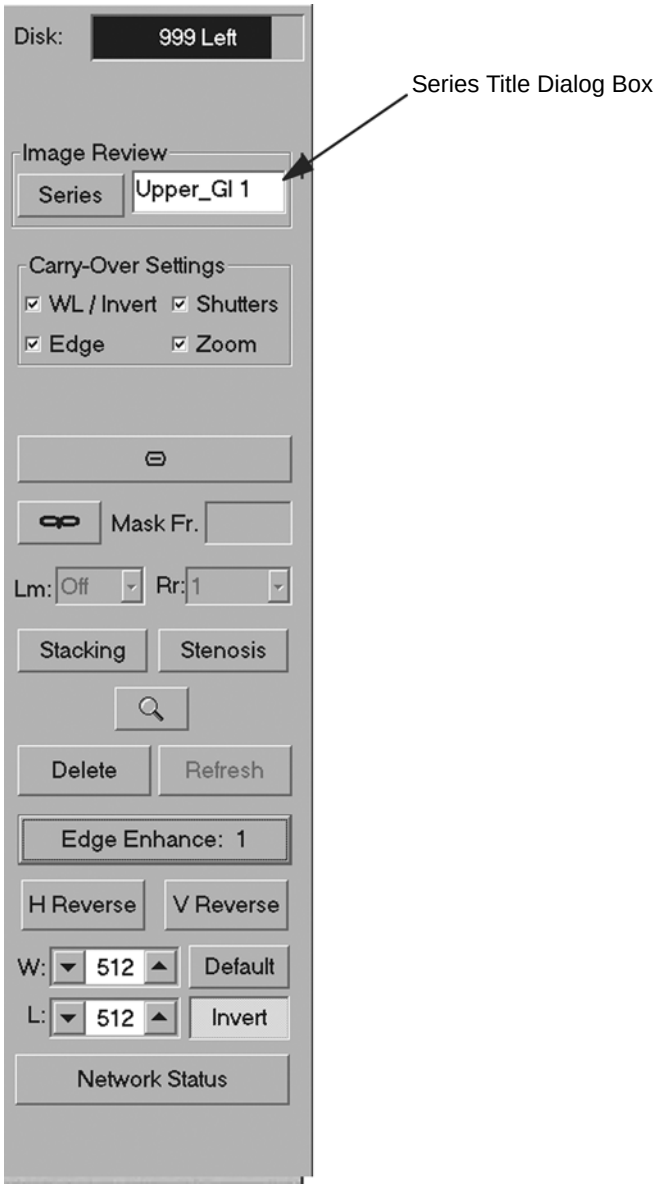
SECTION 2
EDIT SERIES TITLE

New series are automatically assigned a Series Number. A new series is created with each multiple frame acquisition. This feature allows you to change the name of the series to something more descriptive. The maximum number of series including current series and deleted series is 80 per patient file.

NOTE: If a series title is entered in the Series Title dialog box, you must select ENTER or RETURN to record this entry.

ILLUSTRATION 6-4
EDIT SERIES TITLE SCREEN



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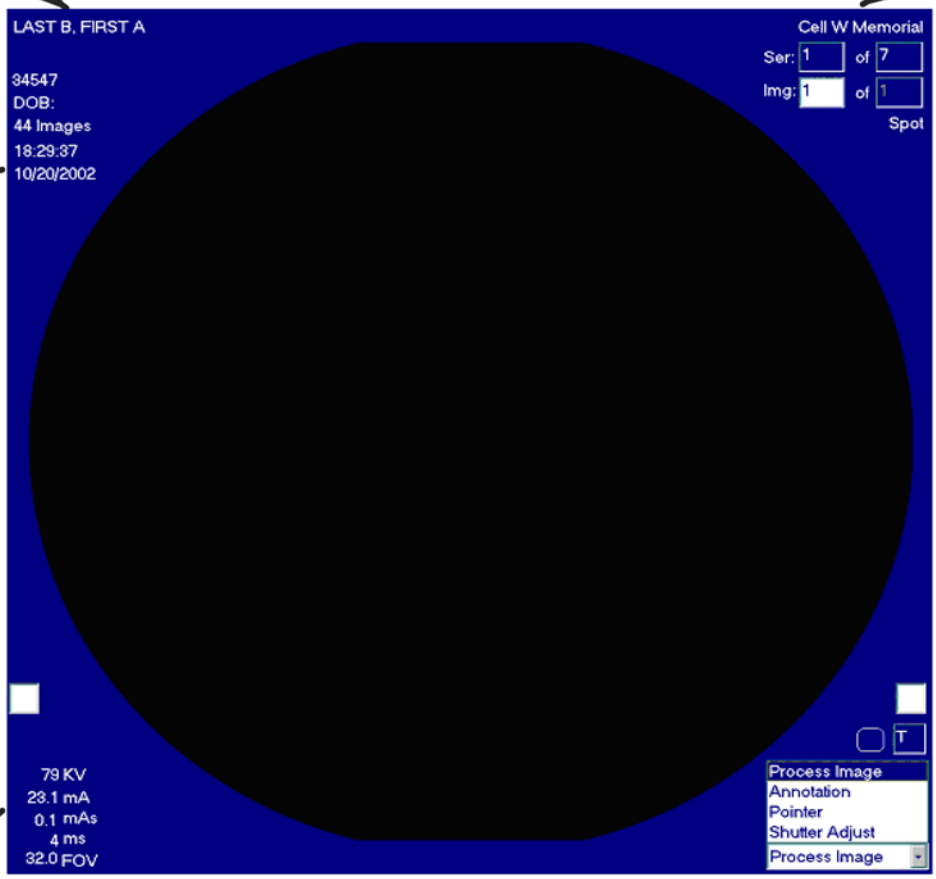
Acquisition information is shown on the image portion of the screen.

ILLUSTRATION 6-5
IMAGE SCREEN INFORMATION

Patient Name, Doctor Name, Patient ID #, Date of Birth and number of total images in patient file. These fields are not editable.

Image Type is not editable.
Image X of Y:
Can enter any # in the X box to jump to that image frame #.



Date and Time images were acquired

kV, mA, mAS, MS, SM FS

Process Image pull up menu

NOTE: The Horizontal and Vertical settings remain active and are applied to the next image acquisition.

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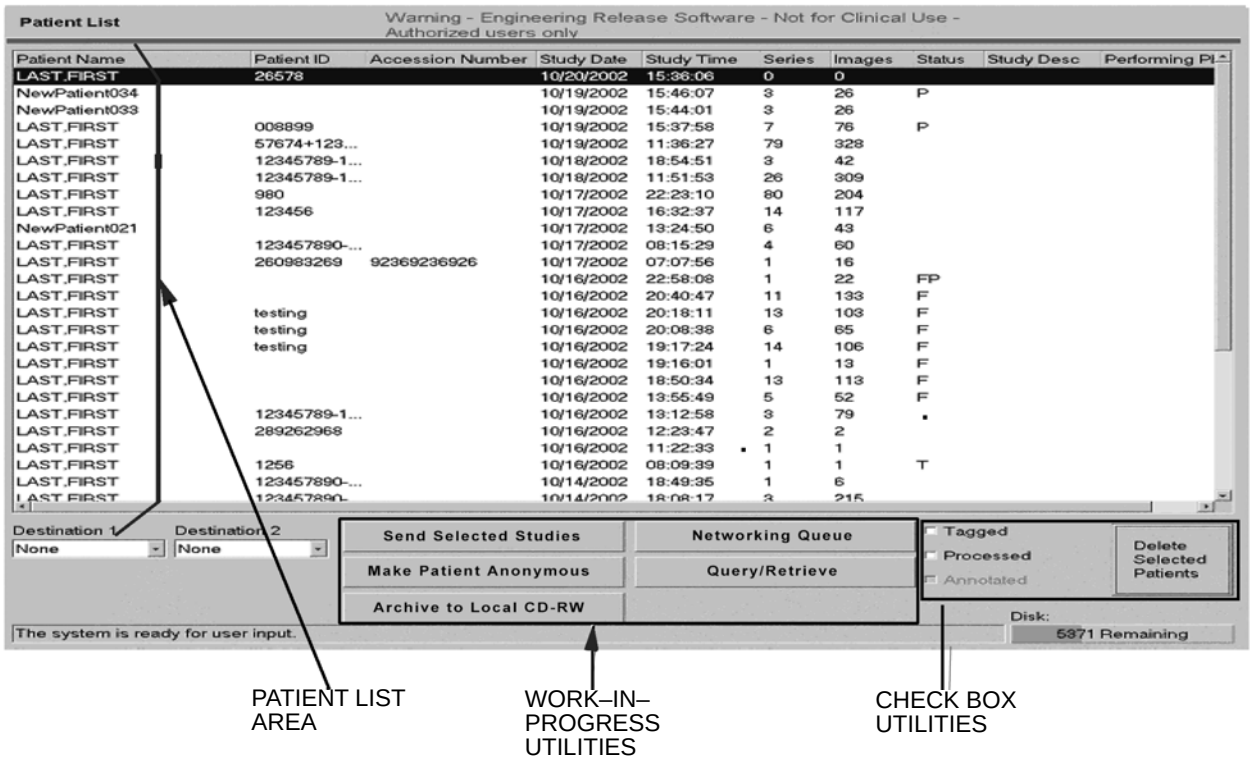
SECTION 3
PATEINT LIST SCREEN

The Patient List screen appears on the Digital Image monitor once the IUI console has booted up.

Depending on system configuration, the exam room monitor is blanked whenever the patient list is displayed (for patient privacy). The exception is for rooms with no control room monitor; in this case the exam room monitor will always display the patient list.


Patient List
Warning - Engineering Release Software - Not for Clinical Use -
Authorized users only
Patient Name
Patient ID
Accession Number
Study Date
Study Time
Series
Images
Status
Study Desc
Performing Pl
LAST,FIRST 26578 10/20/2002 15:36:06 0 0
NewPatient034 10/19/2002 15:46:07 3 26 P
NewPatient033 10/19/2002 15:44:01 3 26
LAST,FIRST 008899 10/19/2002 15:37:58 7 76 P
LAST,FIRST 57674+123... 10/19/2002 11:36:27 79 328
LAST,FIRST 12345789-1... 10/18/2002 18:54:51 3 42
LAST,FIRST 12345789-1... 10/18/2002 11:51:53 26 309
LAST,FIRST 980 10/17/2002 22:23:10 80 204
LAST,FIRST 123456 10/17/2002 16:32:37 14 117
NewPatient021 10/17/2002 13:24:50 6 43
LAST,FIRST 123457890-... 10/17/2002 08:15:29 4 60
LAST,FIRST 260983269 92369236926 10/17/2002 07:07:56 1 16
LAST,FIRST 10/16/2002 22:58:08 1 22 FP
LAST,FIRST 10/16/2002 20:40:47 11 133 F
LAST,FIRST testing 10/16/2002 20:18:11 13 103 F
LAST,FIRST testing 10/16/2002 20:08:38 6 65 F
LAST,FIRST testing 10/16/2002 19:17:24 14 106 F
LAST,FIRST 10/16/2002 19:16:01 1 13 F
LAST,FIRST 10/16/2002 18:50:34 13 113 F
LAST,FIRST 10/16/2002 13:55:49 5 52 F
LAST,FIRST 12345789-1... 10/16/2002 13:12:58 3 79
LAST,FIRST 289262968 10/16/2002 12:23:47 2 2
LAST,FIRST 10/16/2002 11:22:33 1 1
LAST,FIRST 1256 10/16/2002 08:09:39 1 1 T
LAST,FIRST 123457890-... 10/14/2002 18:49:35 1 6
Destination 1
None
Destination 2
None
Send Selected Studies
Networking Queue
Make Patient Anonymous
Query/Retrieve
Archive to Local CD-RW
Tagged
Processed
Annotated
Delete Selected Patients
Disk:
5371 Remaining
The system is ready for user input.
PATIENT LIST AREA
WORK–IN–PROGRESS UTILITIES
CHECK BOX UTILITIES

Functionality of the Patient List Screen:

- Destination 1 & 2:
  Lists devices which store patient studies.
- Send Selected Studies:
  Selected Patient studies are sent to designated storage or printing devices.
- Archive to Local CD–RW:
  Images are sent to be archived to CD–RW. The CD–RW drive is located on the IUI console.
- Networking Queue:
  This function details the activities of files that are either being stored or printed.
- Query/Retrieve:
  This will retrieve or look for files located on a CD–RW.

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NOTE: Retrieving patient files from a CD is not available at this time.

- Delete Selected Patient(s):
  This will mark the image with a “D” in the lower right corner of the Image screen. Refer to Section 16 for further information.

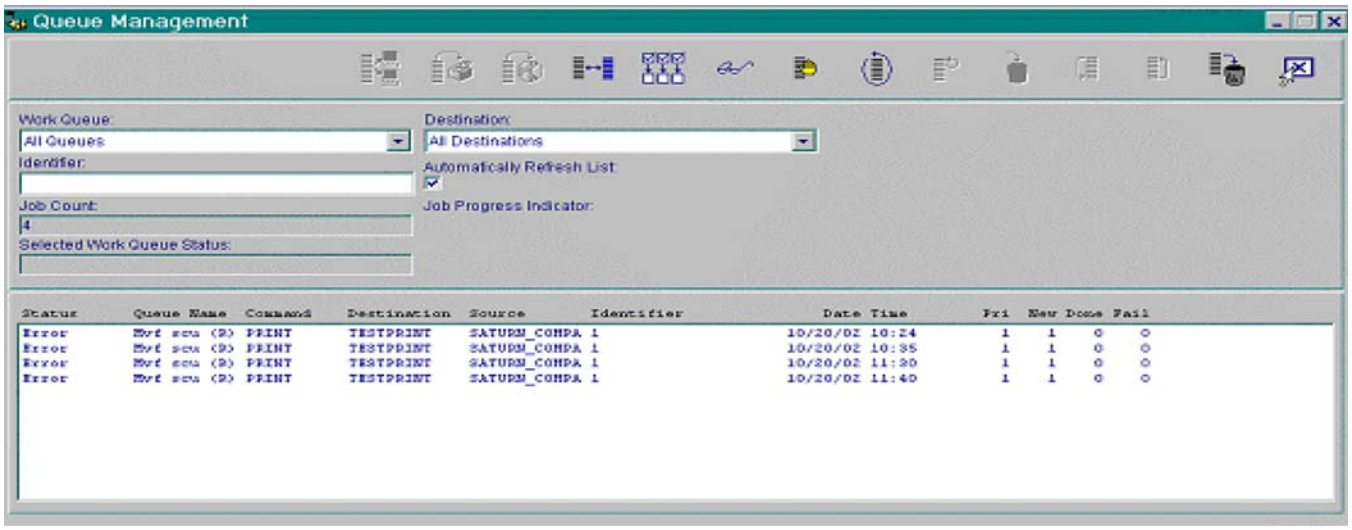
- Disk:
  Disk space indicator explained in Section 1-2.

Check boxes:
If these boxes are selected, images modifications are printed or saved to CD with these changes; the original will remain intact.

- Tagged: Images that have been “Tagged” in a film batch, refer to Chapter 5, Section 2-6 for this utility.

  Processed: Shutter adjustements, edge values, and window level are applied to the image

  Annotated: Text comments are included on the Image also see Section 6 for this function.


Queue Management
Work Queue:
All Queues
Destination:
All Destinations
Identifier:
Automatically Refresh List:
Job Count:
Job Progress Indicator:
4
Selected Work Queue Status:
Status Queue Name Command Destination Source Identifier Date Time Pri Rev Done Fail
Error PRINT TESTPRINT SATURN_COMPA 1 10/20/02 10:24 1 1 0 0
Error PRINT TESTPRINT SATURN_COMPA 1 10/20/02 10:35 1 1 0 0
Error PRINT TESTPRINT SATURN_COMPA 1 10/20/02 11:30 1 1 0 0
Error PRINT TESTPRINT SATURN_COMPA 1 10/20/02 11:40 1 1 0 0

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SECTION 4
AUTO SEND TO REFERENCE IMAGE MONITOR (WITH REFERENCE MONITOR INSTALLED)

NOTE: This feature is only available where the Reference Monitor Display feature and hardware are already installed.

This feature is optional and must be installed by a trained service engineer. Contact your local service or sales agent to order this feature.

When radiation is applied (either fluoro or spot radiation) the currently displayed Last Image Hold image (Fluoro, Spot, or Roadmap type) is forwarded to the Reference Monitor. If no Last Image Hold Image is currently displayed on the main monitor, nothing will be sent to the Reference Monitor.

- You can still manually send an image to the Reference Monitor by clicking on the Save button in the Reference Image section of the feature menu.

NOTE:

- You may resize columns by moving the cursor across the column boundary and double clicking when the pointer turns to an arrow cursor. The column will then be resized to accommodate the longest entry listed.
    - Clicking on the **Patient Name** column header will sort names A through Z; A second click will reverse the order, sorting Z through A.
    - The **Doctor** column header may also be sorted in this manner, clicking the column header to toggle the alphabetical sort functions.
    - The **Series** column may also be sorted by the smallest to highest number of patient series and vice–versa.
    - The maximum number of series to any exam is 80.
    - The Date column can be sorted to list either the most recent patient files at the top of the list, or the oldest patient files at the top. The DATE field represents when the patient file was created, NOT when the file was last accessed.
- When done editing the patient data, select the **OPEN** button to begin acquiring images or **CANCEL** to save changes and close the file.

SECTION 5
SELECTING A PATIENT FILE – REVIEW MODE

5-1Selecting Review Mode

Select the Patient's Name or Patient ID# for the file you want to review.
Select the Review Exam button from the IUI console.
Image(s) for that patient appear on the Digital Image monitor.

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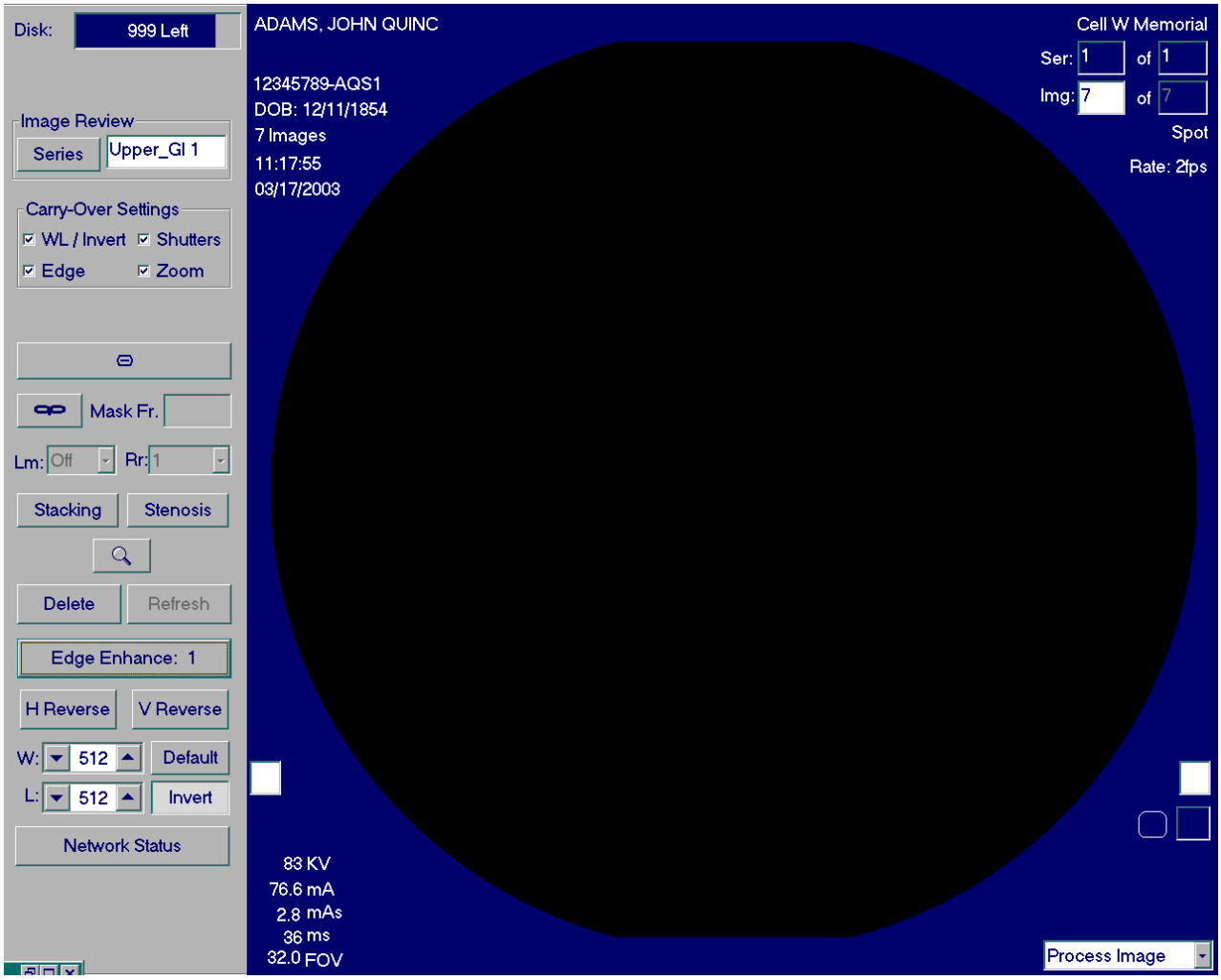
ILLUSTRATION 6-6
REVIEW SCREEN



SECTION 6
IMAGE ACQUSITION

NOTICE

If great variances in image quality occurs, the Quality Assurance Process (QAP) test should be done.

This QAP process is a means to monitor image quality. It is recommended that this test be performed on a weekly basis. Refer to Appendix B, Section 2 for QAP instructions.

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6-1Acquisition Rates

Select **RATE** from the IUI console or the IDD.

The rate include single and multiple acquisition rates of single, 1, 2, 3, 4, 5, 6, and 7.5 frames per second.

The active rate is also shown in the upper right corner of the black mask area as images are acquired.

The fluoro loop rates available are 4(3.75), 7.5, 15, 30 frames per second.

Manual Shutters

This feature allows you to adjust separately each side of the black mask which surrounds the image.

1. Select the **"Shutter Adjust"** option from the Process Image pull-down list (lower right corner of the monitor screen).
2. Click the **right** button on the mouse. A 4-choice menu appears, select **"Manual"**. This begins the manual shutter feature operation.
3. Use the mouse to position the cursor (cursor should look like: #) near the shutter side you want to adjust. Click the **left** button on the mouse to select that side.
4. Move the mouse to place the shutter in the desired position. The shutter will move with the cursor movement.
5. Click the **left** button on the mouse when the shutter is in the desired place.
6. Repeat steps 3 – 5 to change any other shutters.
7. Select the "**Process Image**" option from the Process Image pull–down list to accept the shutter positions and allow normal operations. See ILLUSTRATION 6-7.

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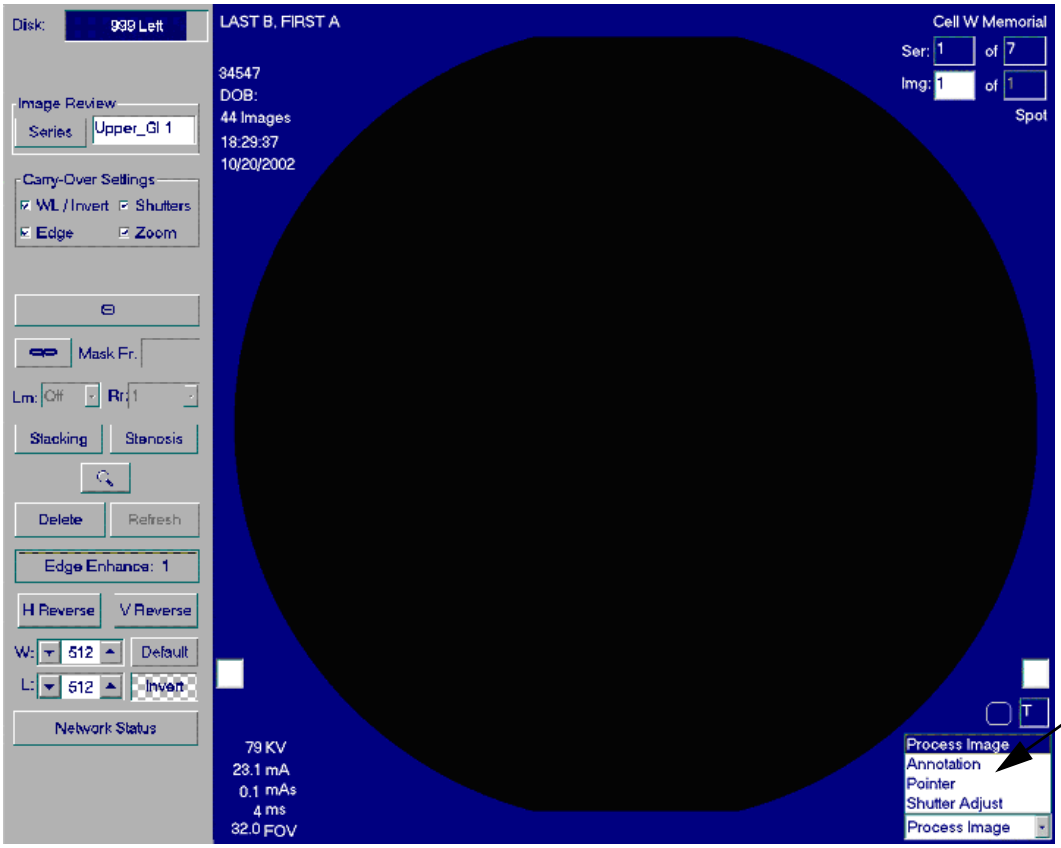
ILLUSTRATION 6-7
PROCESS IMAGE SCREEN



6-2Image Subtraction

NOTE: If images were acquired subtracted, the images will automatically be shown subtracted when you enter Review mode.

NOTE: The Subtraction feature is an Advanced Digital Package item option.

The Subtraction feature is used for post–acquisition image subtraction. Any image can be declared a mask image, and all subsequent images in the series will be subtracted from it.

1. Select the MASK button when the desired mask image is displayed.
2. The current frame # should appear in the FRAME# box (to the right of the MASK button).

NOTE: User may select subtraction button and the first image of the sequence will be used as the mask.

NOTE: Individual images and fluoro images may not be subtracted.

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3. Use the Image Replay buttons to advance the image display either dynamically or by single frames. All images besides the mask frame should be shown subtracted when reviewed.

4. There are multiple degrees of subtraction available so landmarks can be visible or removed during the image subtraction. See below for instructions.

Once the **MASK** button is selected the LANDMARKING (%) and **REREGISTRATION (Rr)** menus will appear on the screen.

1. Select the desired setting from the LANDMARKING % pull–down list. *Acquire Mode* = 100%, 50%, 25%, and 0%. *Review Mode* = 100%, 50%, and 25%.

2. To change the current mask frame #, enter the desired # in the Mask **Frame #** box.

3. To deactivate the Subtraction feature, select the **SUBTRACTION** button again.

6-2-1 Reregistration of Subtracted Images

If a subtracted image is not properly aligned with the mask image, the mask image can be moved pixel–by–pixel in any direction until aligned.

1. Ensure the **MASK** feature button is selected.

   - The process image box on the bottom–right corner of the screen shows “Reregister Image”.
   - The group of buttons (4 arrow buttons and a “House” button) appears in the lower left corner of the image area.

2. To register an image with the mask image, simply position the cursor to the image area of the screen, and click–and–hold the left mouse button. When the image is aligned correctly click the pointer device button again to set

   If you prefer, you can select any one of the 4 arrow buttons to move the image in that direction.

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ILLUSTRATION 6-8
REREGISTER IMAGE SCREEN

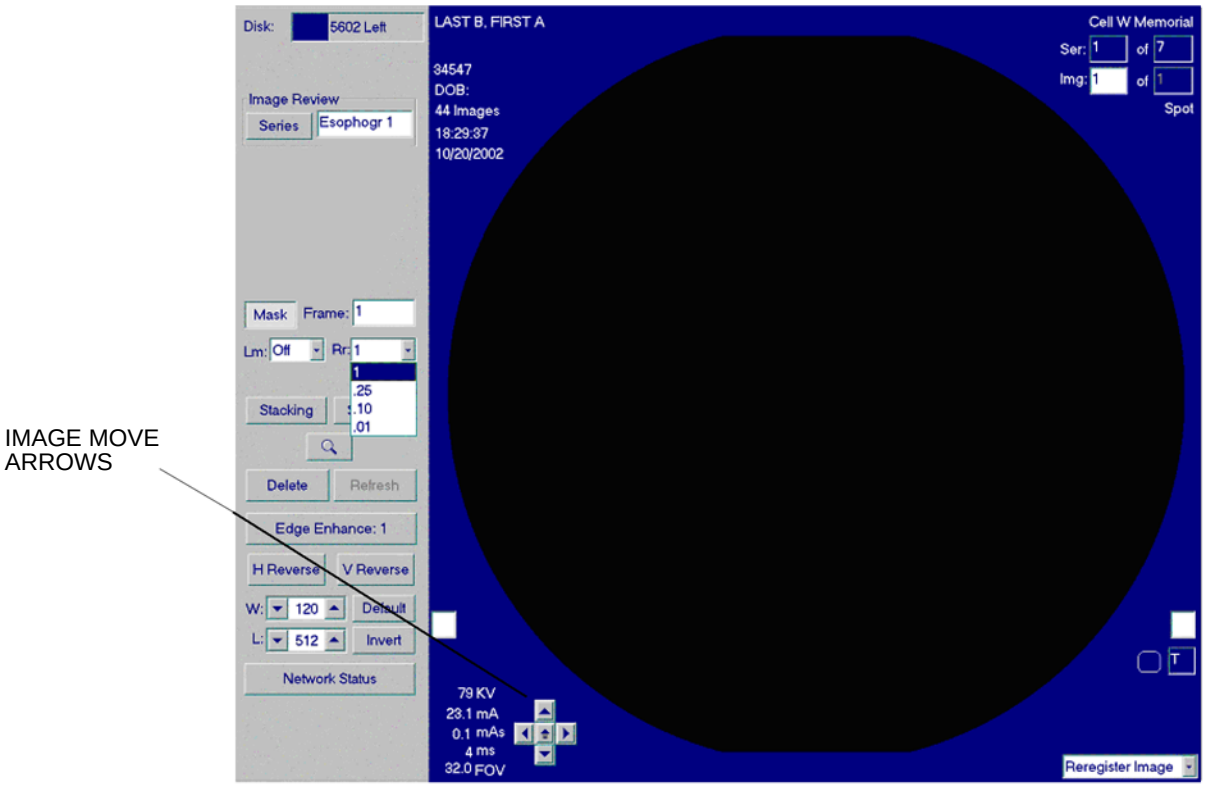

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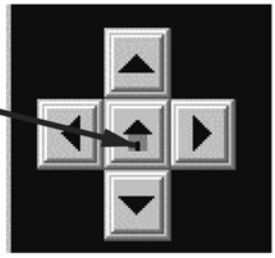
ILLUSTRATION 6-9
SUBTRACTION FEATURE BUTTONS

The “House” button (shown at the center of the 4 arrow buttons) resets the pixel and sub–pixel re–registration values to 0 in all directions (e.g. both images are in the original acquisition positions).

While the Re–registration feature is active, the keyboard “Home” key performs the same as the “House” screen button.



The “Rr” pull down box is used to turn on/off sub pixel reregistration by percentages.

- When a fractional number (0.25, 0.1, or 0.01) is selected, the system goes into sub–pixel mode. Each click of an arrow button equals movement of that fraction of a pixel, in the direction of the arrow.
- When a whole pixel (1) is selected, each click on the arrow button

6-2-2 Mask Refresh During Multiple Image Display

Subtracted images may be viewed during either 4:1 or 16:1 display formats.

1. To activate this feature select the **Mask** image as normal.
2. To change the **Image Display** on the IUI. Select either the 4:1 or 16:1 format listed on the IUI screen.
3. The Digital Image screen will change to show the multiple subtracted images starting with the mask image.

You can also change the **Mask** image during Multiple Image Display:

1. During multiview display, select the desired mask image and select the **MASK** button.
2. All the images on the screen will be re–displayed subtracted using the new mask image. The mask image screen will be grayed.

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SECTION 7
IMAGE STACKING (AND MAX/MIN OPACIFICATION OPTION)

The Image Stacking feature can be used during the Review mode and *On–Line Review* mode to consolidate a series of images into a single image, showing the blood vessel completely filled with contrast media.

The term *Image Stacking* is used as a general term covering the specialized features:

Maximum Opacification
Minimum Opacification
Multi–Mask (also called frame averaging)

NOTE: Only **record images within the same run** can be stacked.

Image Position: Stacked images are stored at the end of the current run of images, just after the loop of images.

Auto Replay: The Stacking feature button is not available if Auto Replay is active.

Image types that **cannot** be stacked include: Fluoro, Already-stacked image, Roadmap, and DICOM Processed images received into the digital system.

NOTE: If a subtracted stacked image is toggled to unsubtracted, it cannot be toggled back to subtracted. The user may recreate the stacked subtracted image, but the stacked image cannot return to a subtracted display.

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ILLUSTRATION 6-10
STACKING SCREEN

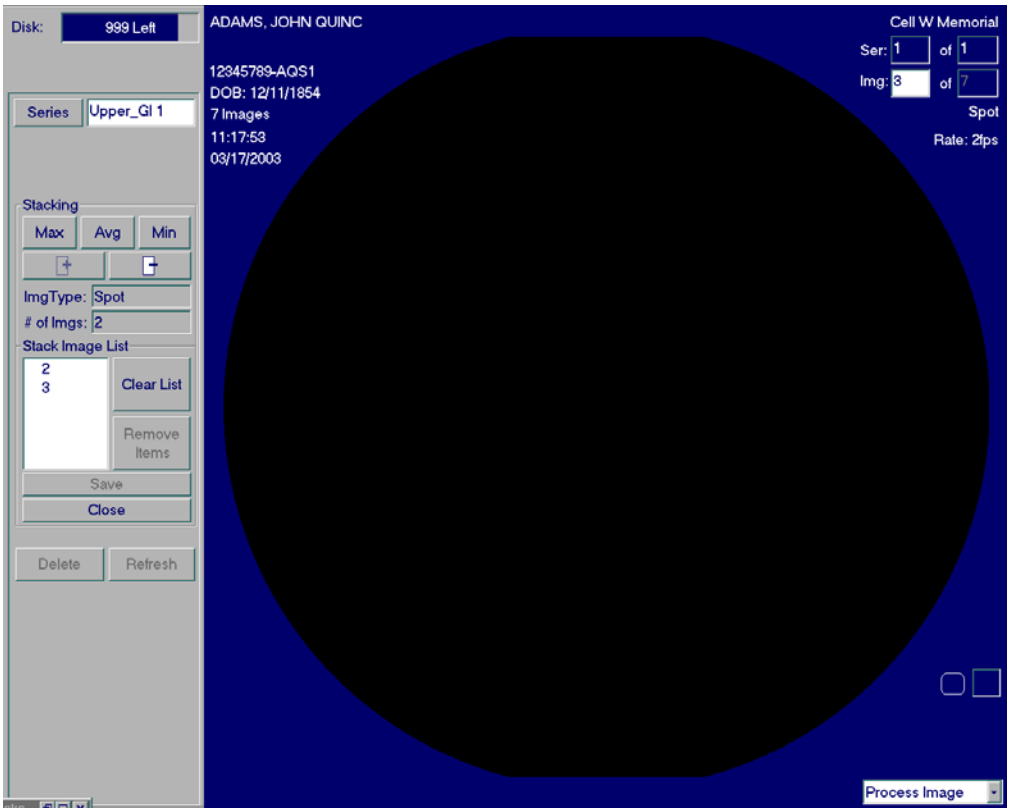

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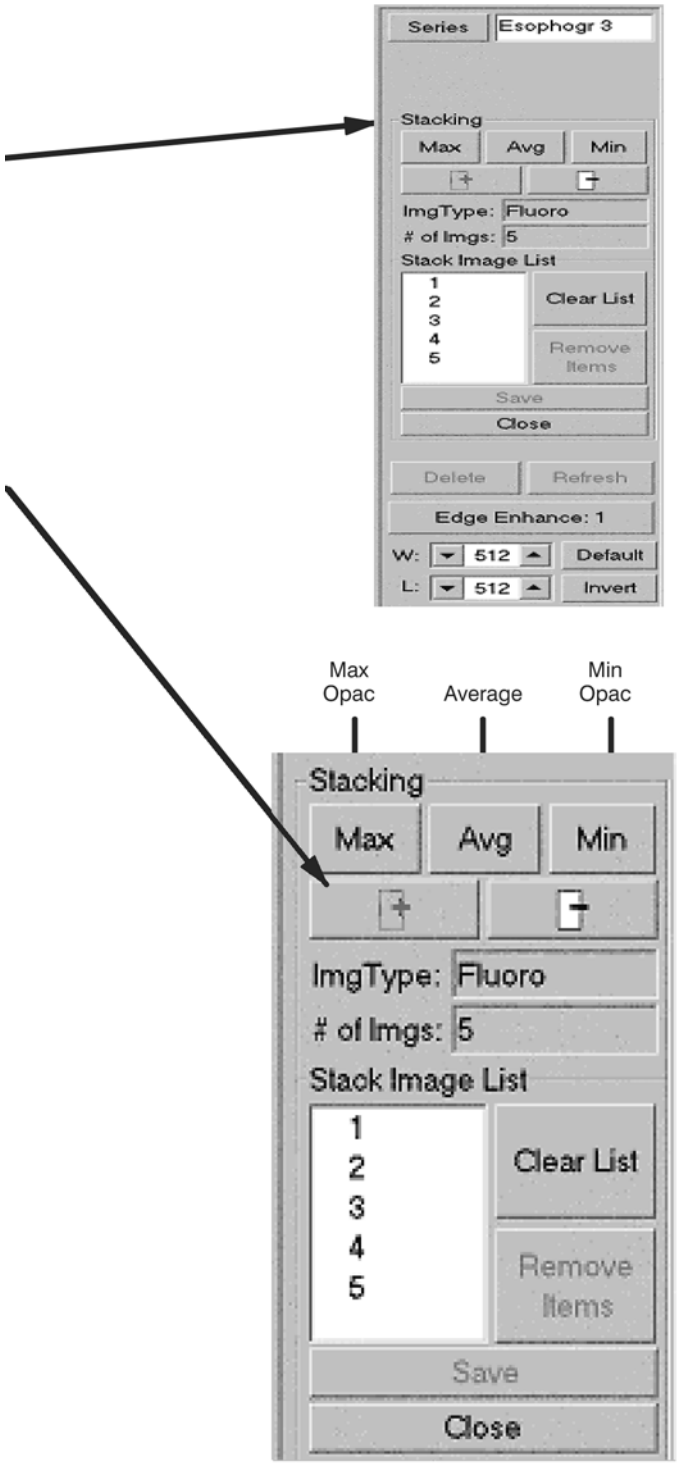
ILLUSTRATION 6-11
IMAGE STACKING BUTTONS



1. You must be in *Review* mode, with the desired patient file, run, and first desired image already displayed.

2. Select the **Stacking** button to access the Stacking menu.

3. Select the **+** Image button to add the current image to the Stack List. The image frame # will be added to the Stack Image list.

4. Use the **FRAME FWD** or **REV** arrow buttons to view additional images. As each desired image is displayed, select the **+** Image button to add that image to the Stack Image list.

   Note: For building a list of numerous images it may be easier to select the desired images while in 4:1 or 16:1 image display. Click the mouse button when the arrow cursor is over the desired image to highlight the image, then select the + Image button to add it to the list.

5. Once all the desired images have been added to the list, select the appropriate Image Stacking button (Max Opac, Min, Opac, or Average). The stacked image is displayed on the monitor.

6. When the desired images are stacked, select the **Save** button to store the stacked image to the hard disk. The system will clear the stack list.

7. Select the **Close** button to cancel the stacking feature.

8. Select the **Unload** button to unload the stack. The image frame counter will then change to show the additional stacked image(s) have been added to the end of the run.

9. At any time you are in this *Review* Mode (Stacking feature turned off, and loop images unloaded), you can use the Frame Fwd or Reverse arrow buttons to view the specific stacked image(s) at the end of the run.

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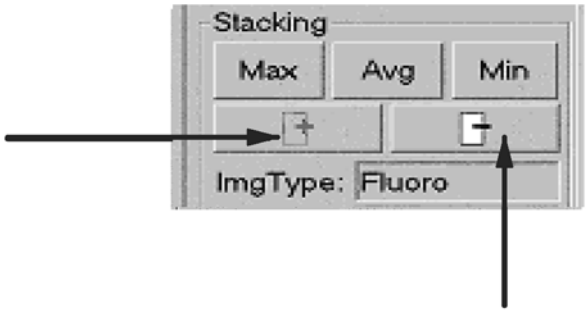
ILLUSTRATION 6-12
IMAGE STACKING PROCESSING BUTTONS

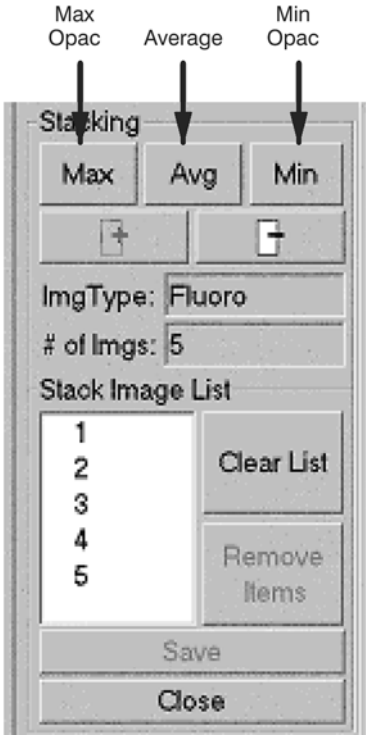


Add Single Image to Stack List:

When selected, this button adds the current image to the Stack list. The currently displayed image type must match the Stack type (assuming the currently displayed image is not already in the stack list).

Remove Single Image From Stack List:

When selected, this button removes the current image from the Stack list. This button is only available when the current image has already been added to the Stacking list, and before the stacked image has been saved to disk.



Stacking Buttons –

When selected, any one of the Stacking buttons enables the stacking process. These buttons become available once an image has been added to the Stacking list.

There is no limit on the number of images that can be used to create a Max or Min Opac image.

When you select the **Average** button a Multi–frame Mask image is created. A maximum of 64 images can be included in the Multi–frame stacked image.

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ILLUSTRATION 6-13
IMAGE STACKING PROCESSING BUTTONS

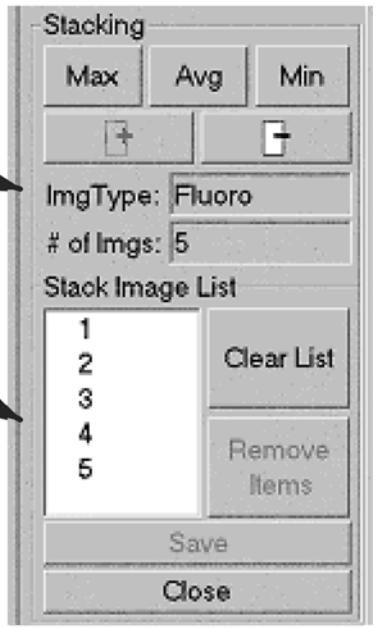
The **Image Type** box lists the image types currently in the Stack List (Fluoro and Spot). The type of the first selected image determines the image type listed in this box.

The **Stack Image List** displays the image frame #'s currently included in the stack list.

The **Clear List** button will remove all the images in the Stack List. A confirmation message appears before the images are removed.

The **Remove Items** button will remove a single highlighted image or a range of images from the Stack List.

The **Save** button will store the stacked image to the hard disk at the end of the run (outside the loop). The image count does not change until you select the Close button, and select the Unload Loop button.



SECTION 8
CONRAST / WINDOW

The **Window** (W) up / down arrow buttons are used to increase or decrease the amount of contrast in the image display. The numeric display of the Window setting is shown in the lower left corner of the screen.

A setting of 512 represents the default image contrast. Press the **DEFAULT** button to return the Window setting to the default value depending on image type.

The default value is set by your Service Agent. Separate Window, Level and Polarity defaults are set for each image type.

The **Window** setting can be carried over to subsequently reviewed images as part of the Carry Over feature described in Section 14.

The Window and Level can also be adjusted by using the mouse. Place the mouse cursor in the image area. Press and hold the left mouse button and move the mouse. Vertical motion adjusts the Level and horizontal motion adjusts the Window.

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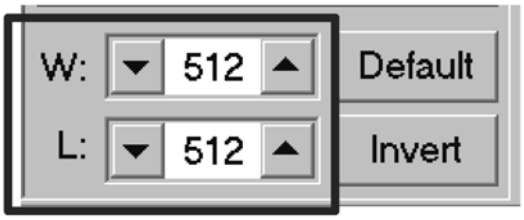
SECTION 9
BRIGHTNESS / LEVEL

The Level (L) up / down arrow buttons are used to increase or decrease the image brightness level. The numeric display of the Level setting is shown in the lower left corner of the screen.

A setting of 512 represents the default brightness level. Press the DEFAULT button to return the Level setting to the default value depending on image type.

ILLUSTRATION 6-14
WINDOW & LEVEL PROCESSING BUTTONS



The Window and Level can also be adjusted by using the mouse. Place the mouse cursor in the image area. Press and hold the left mouse button and move the mouse. Vertical motion adjusts the Level and horizontal motion adjusts the Window.

SECTION 10
IMAGE INVERT

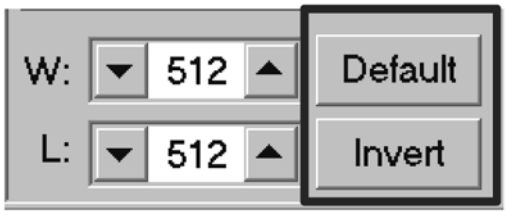
The **INVERT** button changes the polarity of an image from a positive image into a negative image or vice versa.

SECTION 11
DEFAULT

The **DEFAULT** button sets Window, Level, and Image settings to preset parameters depending on image type and the parameters entered in the Field Service Systems Parameters file.

If you wish to change any of these default parameters, contact your Field Service agent.

ILLUSTRATION 6-15
IMAGE & DEFAULT PROCESSING BUTTONS



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SECTION 12
ZOOM

NOTE: The Zoom feature is not available during Multiple Image Display (4:1 or 16:1).

The ZOOM feature magnifies the currently displayed image to twice its size. The center of the image is shown on the monitor screen. Selecting the ZOOM button automatically activates the pan function. Use the mouse to move the display area.

Press the **ZOOM** button again to return to normal image display.

The Zoom setting can be carried over to subsequently reviewed images.

SECTION 13
EDGE ENHANCEMENT

The system is capable of applying 4 levels of Edge Enhancement. Edge Enhancement increases the spatial resolution of the image details.

SECTION 14
CARRY OVER PROCESSING FEATURES

The Carry Over Processing feature provides a quick way to optimize images in a Series. The features used in conjunction with Carry Over are: Window, Level, Invert, Edge, Zoom, and Digital Shutters.

Normally, if you set these features for the first image in the series, the same feature values are desired for the rest of the images in the file or series depending on image file type.

When the Window, Level, or Invert **Carryover** feature is turned ON, the active settings of the image will be carried over to all images until one of the following events occurs:

- The user changes the Window, Level, or Invert setting for an image (then these changed values will be carried over to subsequently reviewed images)
- The user turns OFF the Window, Level or Invert Carryover feature
- The user selects a different Series for review
- The user closes the patient file.

NOTE: There are exceptions to this feature.

- Window, Level, Invert, and Edge settings will be applied to images of the same type. Settings from un-subtracted images will not be applied to subtracted spot images.

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14-1Carry Over Digital Shutters

During real–time replay of any type of rapid acquisition sequence or fluoro loop, only those images within the series will use the same Digital Shutter setting as the first image within that sequence/loop.

When a different loop sequence is selected for review, the Digital Shutters change to the last Shutters applied to the selected loop.

The Digital Shutter setting is not carried over from one sequence of images to the next sequence or between individual images.

NOTE: The Digital Shutters applied when an image is first reviewed/printed/transferred are determined by the **Auto Shutter Default** feature setting. This default setting is only applied the first time an image is reviewed.

If the user changes a Shutter setting for a specific image during Review Mode, the new settings are retained (even through the power on/off cycle). A service engineer can turn ON or OFF the default Digital Shutter setting.

SECTION 15
MULTIPLE IMAGE DISPLAY FORMATS

From Single Image Display review mode, you can view multiple images from the patient file/series by selecting either 4–on–1 or 16–on–1 from the IUI console screen.

- If there are **less than** 4 or 16 images available, the unused image positions will be blanked.
- If there are **more than** 4 or 16 images available in the file/run, you can select the Page Arrow button to load the next set of images.

To return to single image display, select the 1–on–1 option from the IUI Console.

Cursor for Image Selection:

During Multiple Image Display a square cursor (white line of a box) is shown around one of the images indicating it is selected. Touch the desired image on the IUI display if you want to highlight a different image.

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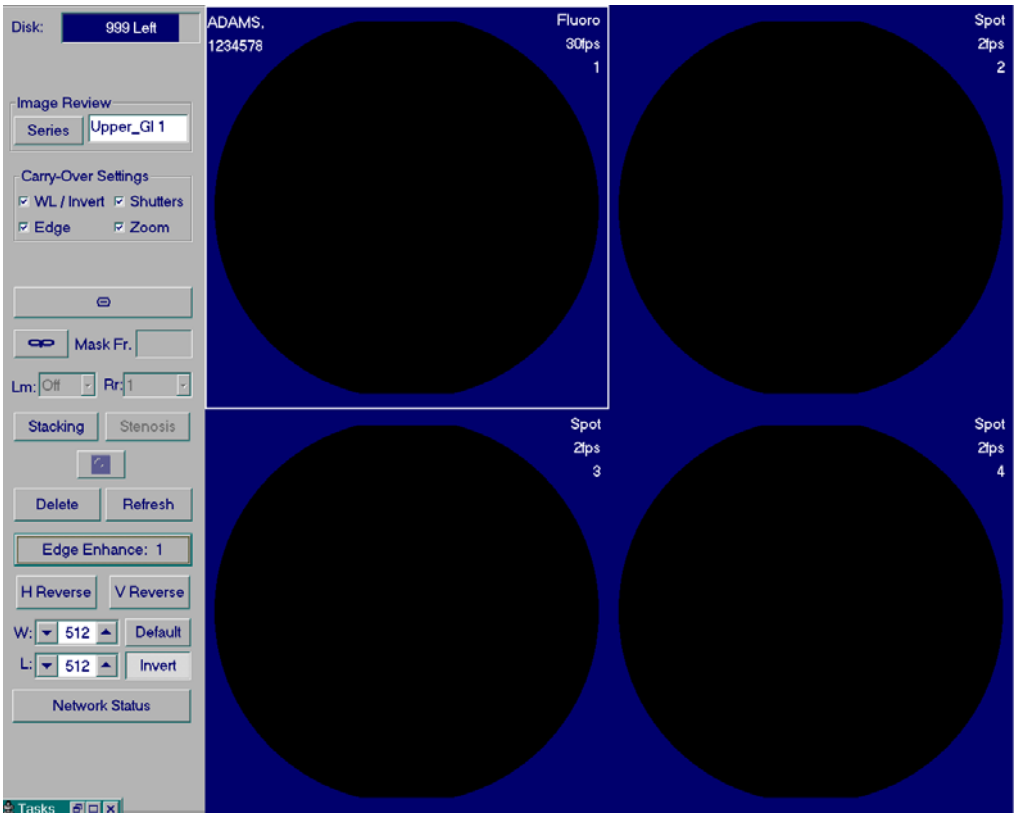
ILLUSTRATION 6-16
CURSOR FOR IMAGE SELECTION



SECTION 16
DELETE IMAGE

Delete images during acquisition:

1. Display images and select DELETE from the Image Display Monitor. A “D” will be displayed in the lower right corner.

To delete a single image stored on the PC hard drive follow the instructions given below:

1. When the undesirable image is displayed on the Image Monitor select the DELETE button in the lower right corner of the Image Screen.

2. A “D” will be displayed in the lower right corner of the image.

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ILLUSTRATION 6-17
DELETE IMAGE TAG

3. When close exam is selected a pop–up dialog box will appear to confirm deletion.

NOTE: If you delete an image with Quantitative Data associated with it, that QA data will also be deleted.

NOTE: When images are subtracted, the mask image cannot be deleted from the series. User may select image to be deleted, but on close of exam will remain in sequence.

WARNING

ONCE IMAGES ARE DELETED FROM THE SYSTEM, THEY CANNOT BE RETRIEVED. ALSO, NO CONFIRMATION MESSAGE IS DISPLAYED.

16-1Annotations & Pointers

The Annotation feature displays a text message on an image. The annotation(s) are displayed each time the image is reviewed, and it will be printed on film.

The Pointer feature displays a dot (pointer head) and an extendible line (tail) on the image. This feature is most often used with an annotation to clarify an anatomical reference point.

APPLY NEW ANNOTATION

Use the mouse to select the ”Annotation” option from the process image pull–down menu (lower right corner of monitor screen).

Position the cursor over the image portion of the screen and click the left button on the mouse.

A small text box for the annotation will appear on the monitor screen. You can use the keyboard to type a message of no more than 35 characters (the box will expand to fit the characters), then press the ENTER key on the keyboard. The annotation will be applied to the image.

– OR –

Click the right button on the mouse to display a list of programmed annotations. Use the mouse to select one of the annotations. The annotation will be applied to the image.

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NOTE: Up to 4 annotations can be displayed on each image. If the annotation is not moved, subsequent annotations will be placed directly above the first annotation on the image screen.

EDIT AN ANNOTATION

1. To change the text of an existing annotation message use the mouse to position the cursor over the annotation and click the right button on the mouse.
2. A sub–menu will appear on the screen near the annotation.
3. Select the “Edit” option. The annotation text will appear in a box.
4. Use the keyboard to change the annotation text.
5. Press the ENTER key on the keyboard to accept the changes.
6. During Edit mode you can position the cursor over the annotation text box and click the right button on the mouse to view the list of programmed annotations. You can select an annotation from this list and it will appear in place of the original annotation.

APPLY POINTER

1. Highlight the “Pointer” option from the process image pull–down list (lower right corner of monitor screen).
2. A cross–hair cursor will appear in the middle of the image display. Using the mouse, position the cursor on the desired place for the pointer head. Click the mouse and continue to hold the mouse button, to set the pointer head.
3. Use the mouse to drag the cross–hair cursor to the desired pointer tail location. Release the mouse button to set the pointer tail. The system will show a line linking the pointer head and tail positions.
4. Up to 4 pointers can be set for each image. Pointers may be attached to Annotation messages by placing the pointer tail on the annotation.

MOVE ANNOTATION

1. To change the position of an existing annotation use the mouse to position the cursor over the annotation and click the right button on the mouse.
2. A sub–menu will appear on the screen near the annotation. Select the “Move” option. A cross–hair cursor will appear on the screen.
3. Use the mouse to reposition the annotation.
4. Click the left button on the mouse to accept the move.

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MOVE POINTER

You can use the mouse to select and move a pointer head or tail to a different location on the image.

1. Use the mouse to position the cursor over any part of the pointer, and click the right button on the mouse.

2. A sub–menu will appear on the screen. Select the “Move Head”, “Move Tail”, or “Move Pointer” option using the right pointer button. A cross–hair cursor will appear on the screen over the part of the pointer you selected to move.

3. Use the mouse to reposition the pointer as you would like it.

4. Click the left button on the mouse to accept the move.

DELETE ANNOTATION OR POINTER

Use the mouse to select the item, then press the right button on the mouse. A sub– menu will appear. Select the DELETE option, and the item will be deleted from the screen.

SECTION 17
PRINTING AN IMAGE

All printing is done via the IUI console. Refer to Chapter 5 for this utility.

SECTION 18
STENOSIS MEASURMENT FEATURES AND STEPS

NOTE: The graphic information from the stenosis analysis cannot be saved or sent to a PACS device. It may only be printed to a laser printer.

In order for the Stenosis feature to perform accurate measurements you must calibrate system for each run before attempting any measurements and the object used for calibration MUST be near the measurement region.

The following size Image Intensifier and catheter size combinations are **NOT permitted**:

12” II (32 cm) 3F
16” II (40 cm) 3F & 4F

All measurement values shown on the screen and used during calculations will be in **millimeters**.

TO SELECT STENOSIS FEATURE:

1. Enter *Review* mode.

2. At the Patient List screen, select desired patient and series.

3. Select the REVIEW button from the IUI Console.

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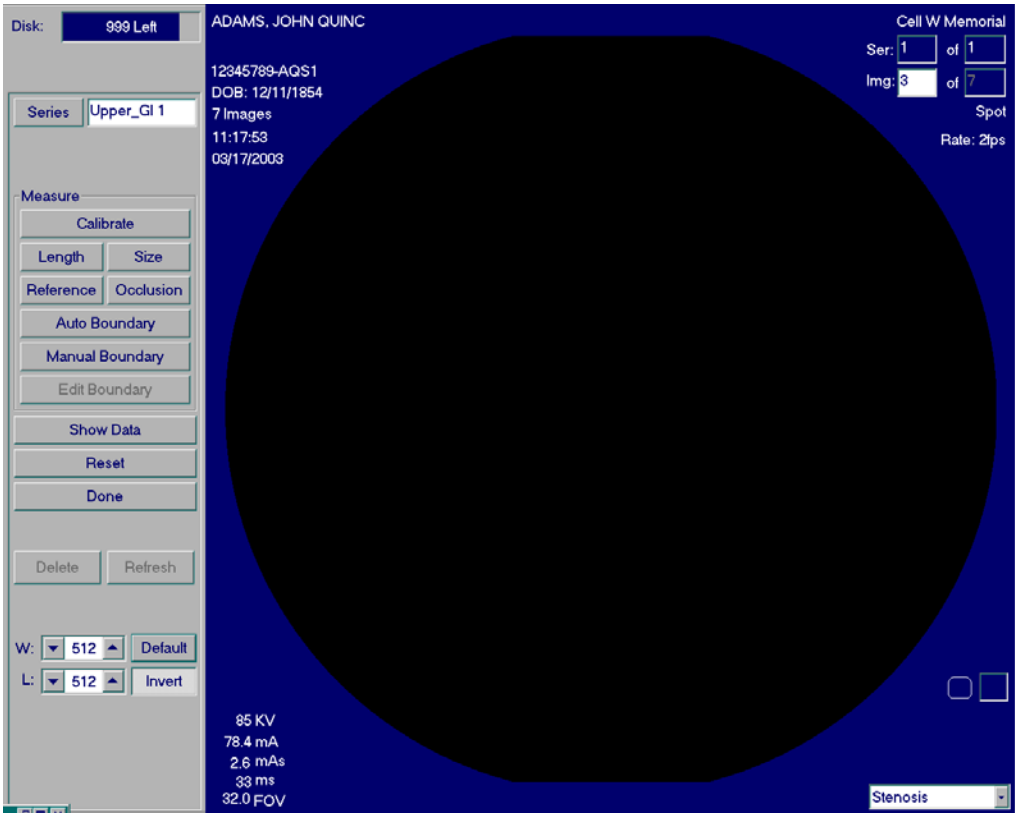
4. Select the Cursor Function pull–down list shown in bottom, right corner of the image portion of the screen.

5. Select the **Stenosis** option. The feature menu on the left will change to show the Stenosis feature buttons.

ILLUSTRATION 6-18
STENOSIS SCREEN



18-1Calibration

Calibrating the system involves the operator defining the outer boundaries of a known diameter. It is important that the calibration be performed accurately, since this procedure allows the system to assign a millimeter value to the “width” of each pixel of the image. This allows for accurate measurements.

The following size Image Intensifier and catheter size combinations are **NOT permitted**:

12” II (32 cm) 3F
16” II (40 cm) 3F & 4F

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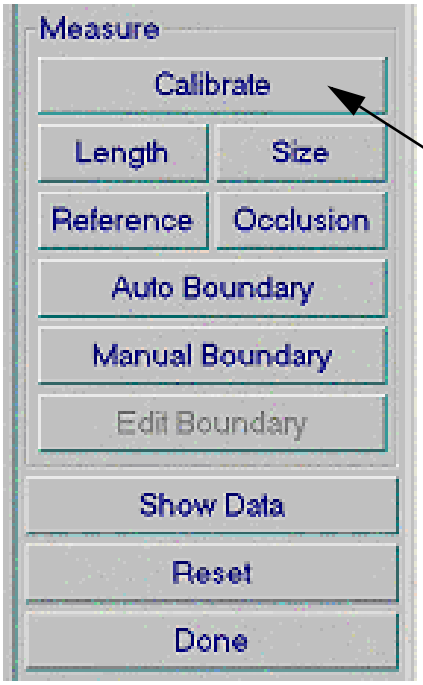
ILLUSTRATION 6-19
STENOSIS MENU



1. You should be in *On–Line Review* or *Review* mode at the image which shows the item you're going to use to calibrate the system (for example: a catheter), and you should have selected the **Stenosis** button from the pull down list.
2. If necessary, select the magnifying glass icon to zoom in on the image.
3. Select the **Calibrate** button.
4. Use the pointing device to position the cursor near either side edge of the item you going to use to calibrate the system.
5. Click and hold the left button on the pointing device.
6. Drag the cursor across the width of the item. As you move the cursor a line is shown on the screen.
7. Release the pointing device button when the line shown on the screen spans the width of the item (it can also go beyond the edge of the item). The screen will change as follows:
   - The **Edge Detection Profile** – **Calibrate** menu will appear over the image (see ILLUSTRATION 6-20).
   - The portion of the line drawn in step 5 which covers the item (as detected by the system) will become shaded.
   - The default calibration value will appear on the image. This value will be updated once you set the actual value for the item's size.

If necessary you can select and move the **Edge Detection Profile** window so it does not cover the por-

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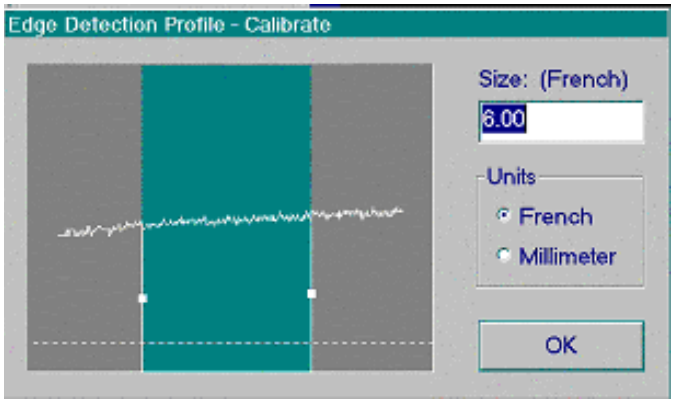
ILLUSTRATION 6-20
EDGE DETECTION – CALIBRATION SCREEN

The darker shaded area of this screen represents the width of the item as detected by the system.



The Size field defaults to Fren ch mode, size 6.00 (= 2.00 mm).

The 2 vertical lines represent the edge points of the item as detected by the system.

The graphical line represents the pixel brightness values for each point along the line as drawn in step 5 above.

8. If you need to adjust the edge points for the calibration item, select & drag either of the small square boxes found on the vertical lines in the graph until they represent the edges of the calibration item as you would like.

9. Select the desired calibration mode: either the ***French*** or ***Millimeters***.

10. Change the numerical value for the item's size by highlighting the Size field and typing in the correct #. The defaults are French mode, size 6.

11. Select the **OK** button to accept the entries as they appear in the menu.

NOTE: The calibration value will remain valid until either the patient file is closed, or you re–calibrate the system. The calibration will remain valid through different images and different runs of the same patient file. Upon exiting the Stenosis feature, the system will return to the default calibration value of French, size 6.

CALIBRATION COMPLETE

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18-2Size

This function allows you to measure the width of any place along the vessel, or a length of balloon needed for a particular lesion.

1. You should be in On–Line Review or Review mode at the desired image, and the system should be calibrated as given in the steps above.
2. The Stenosis feature buttons should be shown in the menu portion of the screen. If not select the Stenosis option from the cursor selection pull down list.
3. If necessary, select the magnifying glass icon to zoom in on the image.
4. Select the Size button from the menu portion of the screen.
5. Use the pointing device to position the cursor at the edge of the vessel area you want to measure.
6. Click and hold the left button on the pointing device.
7. Drag the cursor to the other side of the vessel (you can extend the line beyond the vessel edge). As you move the cursor a line is shown on the screen.
8. Release the pointing device button when the line shown on the screen spans the width of the vessel. The Edge Detection Profile – Size menu will appear over the image.
9. The size of the vessel, based on the calibration performed earlier, is given on the image and in the menu window. If necessary, you can change the boundaries of the vessel by selecting either of the small squares on the vertical lines shown in the graph. These lines represent the end points for the vessel area based on the line drawn in step 7.
10. Select the OK button to close this window. The measurement value and line will remain on the screen.

18-3Reference

This option allows you to quickly establish the size of a normal part of the vessel. This value will be used as a reference for a normal vessel size when calculating percent stenosis values.

1. You should be in On–Line Review or Review mode at the desired image, and the system should be calibrated.
2. The Stenosis feature buttons should be shown in the menu portion of the screen. If not select the Stenosis option from the cursor selection pull down list. Select the Reference button from the menu portion of the screen.
3. Position the cursor at the edge of the vessel section you want to use as a reference measurement.
4. Click and hold the left button on the pointing device.

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5. Drag the cursor to the other edge of the vessel. As you move the cursor a line is shown on the screen.

6. Release the mouse when the line shown on the screen accurately spans the width of the vessel. The **Edge Detection Profile – Reference** menu will appear over the image.

7. The size of the vessel, based on the calibration performed earlier, is given both on the image and in the Reference window. If necessary, you can change theboundaries of the item by selecting either of the small squares on the vertical lines shown in the graph. These lines represent the end points for the vessel as drawn in step 5.

8. Select the OK button to close this window. The measurement value and line will remain on the screen.

18-4Occlusion

This option allows you to quickly establish the size of an occluded vessel. This will be used as the value for the stenotic region of the vessel when calculating the percent stenosis values.

1. Select the **Occlusion** button from the menu portion of the screen.

2. Use the pointing device to position the cursor at the edge of the occlusion you want to measure.

3. Click and hold the left button on the pointing device.

4. Drag the cursor to the other edge of the occluded vessel. As you move the cursor a line is shown on the screen.

5. Release the pointing device button when the line shown on the screen spans the width of the vessel. The **Edge Detection Profile – Occlusion** menu will appear over the image.

6. The size of the occlusion, based on the calibration performed earlier, is given both on the image and in the Occlusion window. If necessary, you can change the boundaries of the item by selecting either of the small squares on the vertical lines shown in the graph. These lines represent the end points for the occluded vessel.

7. Select the **OK** button to close this window. The measurement value and line will remain on the screen.

    - Select the **Print** feature button if you want to print a report for the measurements you have just made (available only if the Thermal Laser Printer option has been installed with your system).

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18-5Manual Boundary

This option allows you to trace the edges of the entire vessel lesion area of interest. The system then uses these boundaries to calculate the percent and actual measurements (if calibrated) of the region of interest.

NOTE: The system should be calibrated prior to performing measurements.

1. Select the **Manual Boundary** button. If it is not shown on the screen, select the Stenosis option from the cursor pull–down list (bottom right corner of image display).
2. To begin the trace of the first edge of the vessel move the cursor to the position you would like to begin with.
3. Click and hold the left button on the pointing device. This sets the starting point for the trace.
4. Drag the center of the cursor along the vessel outline. If you want you can click the pointing device button to set fixed points along the vessel's edge, but it is not necessary. As you move the cursor a line will extend from the last point set to the position of the cursor.
   - To **change any portion of the manual boundary** as you have just drawn it, click the right button on the pointing device. This will remove a section of the trace back to either the last set point, or to the current position of the cursor.
5. Double click the pointing device button when you have completed tracing the first vessel edge. The vessel trace and the cursor remain on the screen.
6. Repeat steps 2– 5 to trace the opposite edge of the vessel. When you double–click the pointing device button to set the last point, the **Stenosis Measurement Results** window will appear (see ILLUSTRATION 6-21).
   - The ***stenosis*** indicator (a circle with a line) based on the minimum diameter region as computed by the digital is shown on the image.

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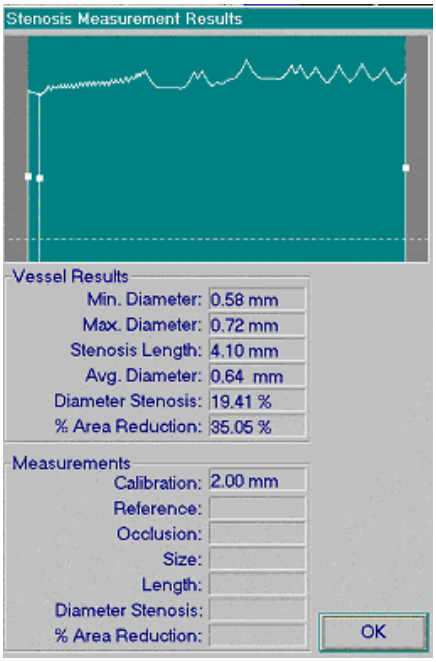
ILLUSTRATION 6-21
RESULTS SCREEN



The graph represents the distance between the vessel edges.

The vertical lines represent the width of the vessel at both ends and the minimum width found within the vessel trace. The end points define the area of the vessel used for the calculations shown in this window.

If necessary, you can change the position of any of the lines shown on the graph by selecting the small square on the vertical line and repositioning it. The measurement values will be automatically updated as you move any one of the lines.

7. **If you wish to adjust the trace points along the vessel**, select the OK button in the results window, then select the **Edit Boundary** button. The two traces will be highlighted by numerous connection points.
8. Use the cursor to select and reposition any of these points in either of the edge traces.
9. When the edge traces are as you would like them, select the **Edit Boundary** button again to accept the changes. The connection points will disappear.
10. To view the Stenosis Measurements using the changed edges, select the **Show Data** button.

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18-6Auto Boundary

If there is already a vessel boundary present, it will be cleared from the display.

The cursor will be changed to a crosshair indicating the system is ready.

There are two different ways of entering centerline points:

Draw Line: To begin, you should position the cursor at the starting point along the centerline of the vessel, and click–and–hold the left button on the mouse (or other pointing device). Then move the cursor along the path of the centerline area of the vessel. When the cursor is at the last desired point, release then double–click the left mouse button. The system will then automatically calculate a vessel boundary starting at approximately the first control point and ending at the approximately the last control point.

Position Points: To begin, you should position the cursor in the starting point, and click the left button on the mouse. This will set the starting point for the centerline measurement. The user would then move the cursor to the next desired point along the centerline of vessel, and click the mouse button again. A line will appear connecting each point as it is set. Any number of points can be entered (minimum = 2). When the last point has been set, double–click the left mouse button. The system will automatically identify the edges of the vessel and calculate the occlusion information.

NOTE: Clicking the right button on the mouse will erase the last entered point.

For either type of entry, once done the vessel profile (detected edges) will be drawn on the screen. The system will then automatically display the *Stenosis Measurement Results* window.

You can manually adjust the vessel limits and the Stenosis position in the same manner as with the old version of the feature (select Edit Boundary button, then point and drag a point to the desired location).

18-7Running Length

This feature involves identifying 2 or more points along the length of any anatomical area. Once all of the points have been entered, the system will automatically calculate the total length of all the segments.

1. When the *Length* button is selected, any previously entered Length line will be cleared from the display.

2. You can enter points for the line using either method described above for the **Auto Boundary** feature.

3. Double–clicking the left button on the mouse will indicate all desired points are entered.

This value will then be displayed on the screen next to the line control points entered, (Example: ” *Length: x.xx mm*”), and shown on the Stenosis Data Table.

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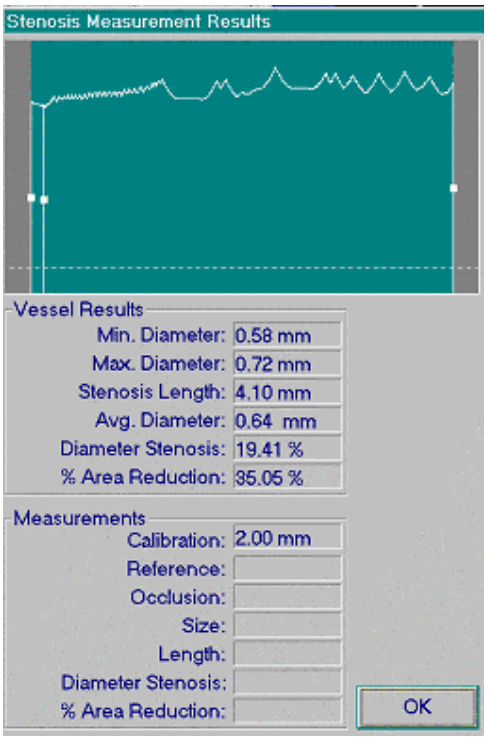
The Length line (actual line or control points) will be included on the film output of the Stenosis data. If any part of the Length line extends beyond the black circle mask surrounding the image, it will not be displayed on the film.

18-8Show Data

Select this feature button to display the results for any stenosis measurements functions recently performed. This window can be moved on the image screen by selecting the title bar and dragging it to a different area on the screen.

ILLUSTRATION 6-22
RESULTS SCREEN



The *Vessel Diameter* graph represents the distance between the vessel edges. This is only available if the Manual Boundary process was performed.

Two of the three vertical lines represent the edges of the vessel, and the third indicates the minimum width within the traced area of the vessel. All three lines are adjustable. You will notice that as the minimum distance line is moved, the stenosis indicator shown on the image is moved accordingly, and the data within this screen is recalculated.

Vessel Results: These measurements are based on the vessel edge traces entered during the Manual Boundary procedure.

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Diameter Stenosis Percentage difference between the minimum diameter and the maximum diameter of the vessel.

% Area Reduction Percentage difference in cylindrical areas using diameter values from the Reference and Occlusion measurements.

Measurement Values:

Calibration Calibration measurement value obtained during calibration procedure, or the last value. The value is given here in millimeters.

Reference Length of the reference measurement, if performed.

Occlusion Length of occlusion measurement, if performed.

Diameter Stenosis Percentage difference in the Reference and Occlusion measurements.

% Area Reduction Percentage difference in cylindrical areas using diameter values from the Reference and Occlusion measurements.

NOTE: If there is Quantitative Analysis data available for an image, it can be printed with the associated image using the **PRINT** button.

Any vessel traces or outlines will be superimposed on the image. The Stenosis Report will follow as a separate image.

Stenosis data is not sent to DACS units.

SECTION 19
DICOM WORKLIST (REQUIRES DICOM OPTION)

This feature allows the system to search DICOM Worklist databases for patient information.

Patient files found during the query can quickly be selected for addition into the patient file database.

- The first element for using this feature is to ensure the DICOM Worklist software option is installed on the system (done by Field Service Personnel, instructions not included here).
- The second element of this feature is the ability to setup the system to automatically send queries to specific DICOM Worklist providers (can be more than one).
- The third element of this feature is the ability to run manual queries for specific patient files at any time.
- The final element of this feature is to open a patient file using the results of DICOM Worklist query.

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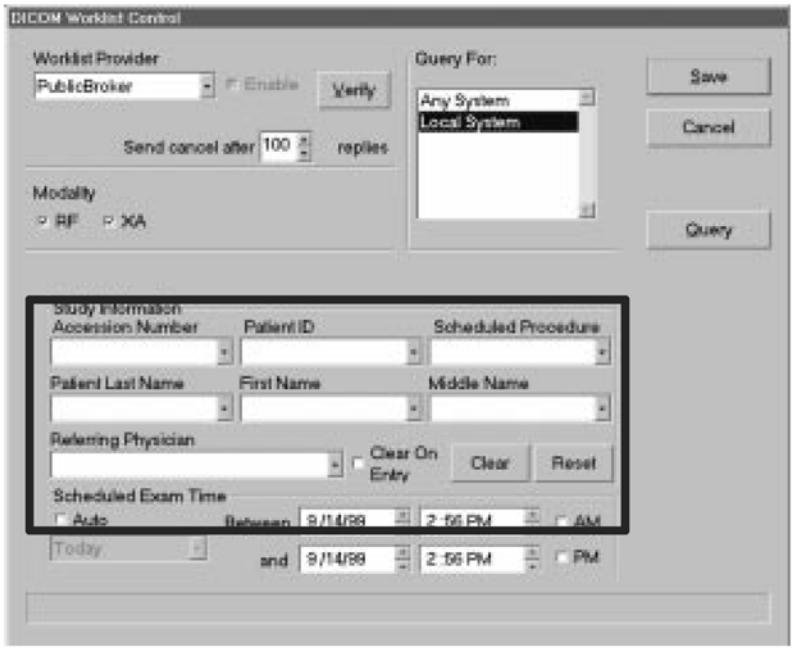
1. Enter the specific criteria for conducting the query in the “Study Information” area of the screen.

   Accession #: Use this field to query the patient records based on accession # or work order # (a unique # for each instance).

   Patient ID#: Use this field to query for a specific patient id # or a series of patient ID #’s (example= 2* for those patient files beginning with the #2).

   Patient Name: Use any of these fields to narrow or broaden the query by patient name. Use of the wild character (*) is allowed. (Example: Last Name = Smith, First Name = Rob*. This will return all patients with a last name of “Smith” and a first name including “Rob” such as “Rob, Robert, or Roberto”.)

ILLUSTRATION 6-23
WORKLIST MANUAL QUERY



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Manual Queries: – Miscellaneous

Clear Upon Entry: If you want to clear all the fields in the Study Information section of the screen whenever this window is opened, select this checkbox. Otherwise the information entered for the last query will appear by default.

Clear: This button will clear all the current data in all of the fields in the Study Information section of the screen so different information can be entered.

Reset: This button will remove all the historical/recent listings in each of the pull–down fields shown the Study Information section of the screen.

Set Default Field for Entry: You can set one field to be the default field for data entry in the Study Information section of the screen by holding down the CNTRL key on the keyboard and clicking in the desired default field box. (This is most useful for bar code scan entries, see below).

Bar Code Scanners: Bar Code Scanners (if installed with the system) can be used to automatically enter some form of patient data. When this screen is presented, use the bar code scanner to scan the patient ID bracelet or patient file. The corresponding field on the screen will be filled in. See Step. 4 to continue.

NOTE: The bar code data must be available on the DICOM Worklist Provider selected.

2. Once the parameters are set as desired, select the **Query** button.

3. The Status bar at the bottom of the screen will show the progress of the query results and any error messages.

4. Once the query finishes, the window becomes active again.

   - If you wish to change a parameter and re–run the query you can do so.
   - When the query has finished, select the **SAVE** button to save the parameters and close the window.
   - Select the **CANCEL** button if you do not want to run the query, or if you want to close this window. If a query was run, the patient files found by the query will remain available.
   - To stop a manual query while it is in process, you can select the **CANCEL** button.

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CHAPTER 7
TABLE

SECTION 1
INTRODUCTION

1-1Overview

The Intelligent Digital Device (IDD), ILLUSTRATION 7-1, is a multi–faceted image receptor for general fluoroscopy and rapid serial radiography diagnostic procedures.

The IDD device:

- Supports the fluoroscopic image system and video camera.
- Provides a high line rate grid to improve image quality.
- Provides a source to image distance range for a 32 cm II: 72.2 cm (28.4 inches) to 100.2 cm (37.4 inches) or for a 40 cm II: 73.8 cm (29 inches) to 101.8 cm (40.1 inches).

ILLUSTRATION 7-1
PRECISION 500D TABLE OVERVIEW

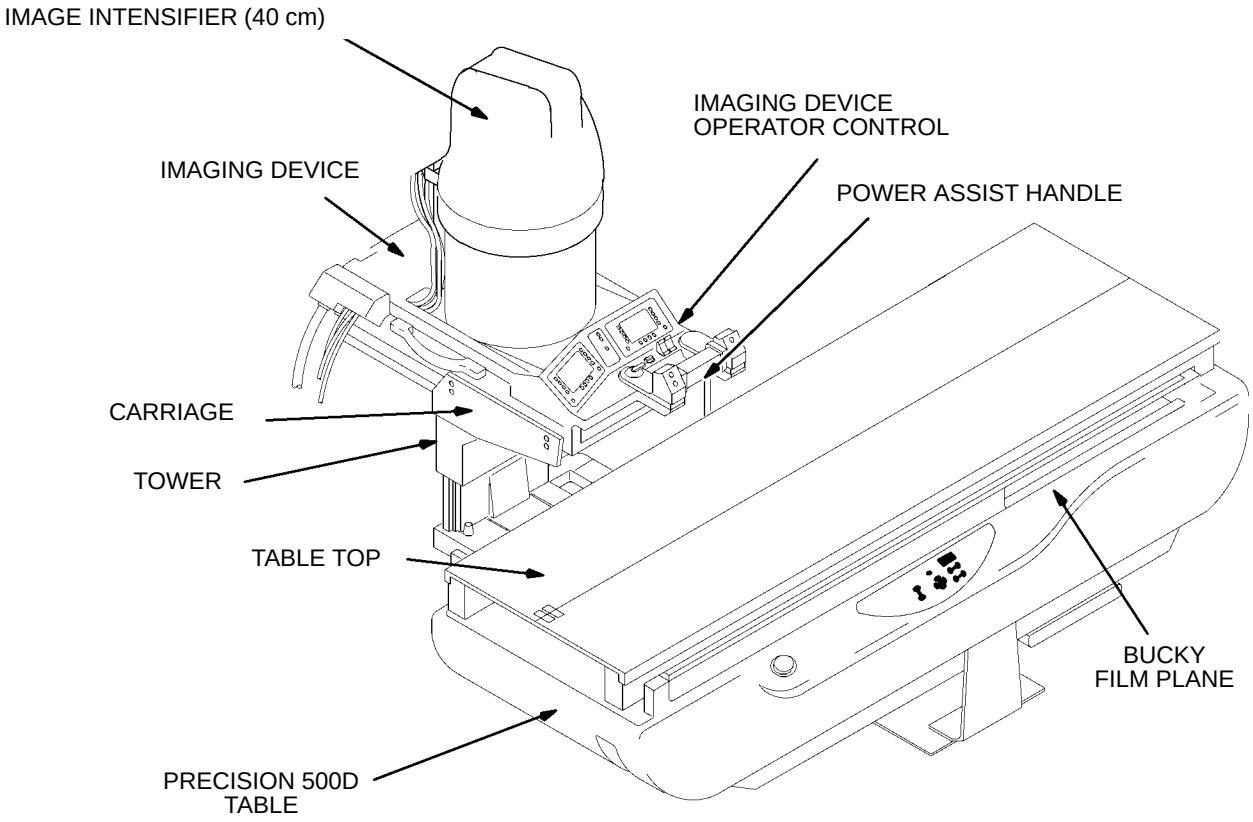

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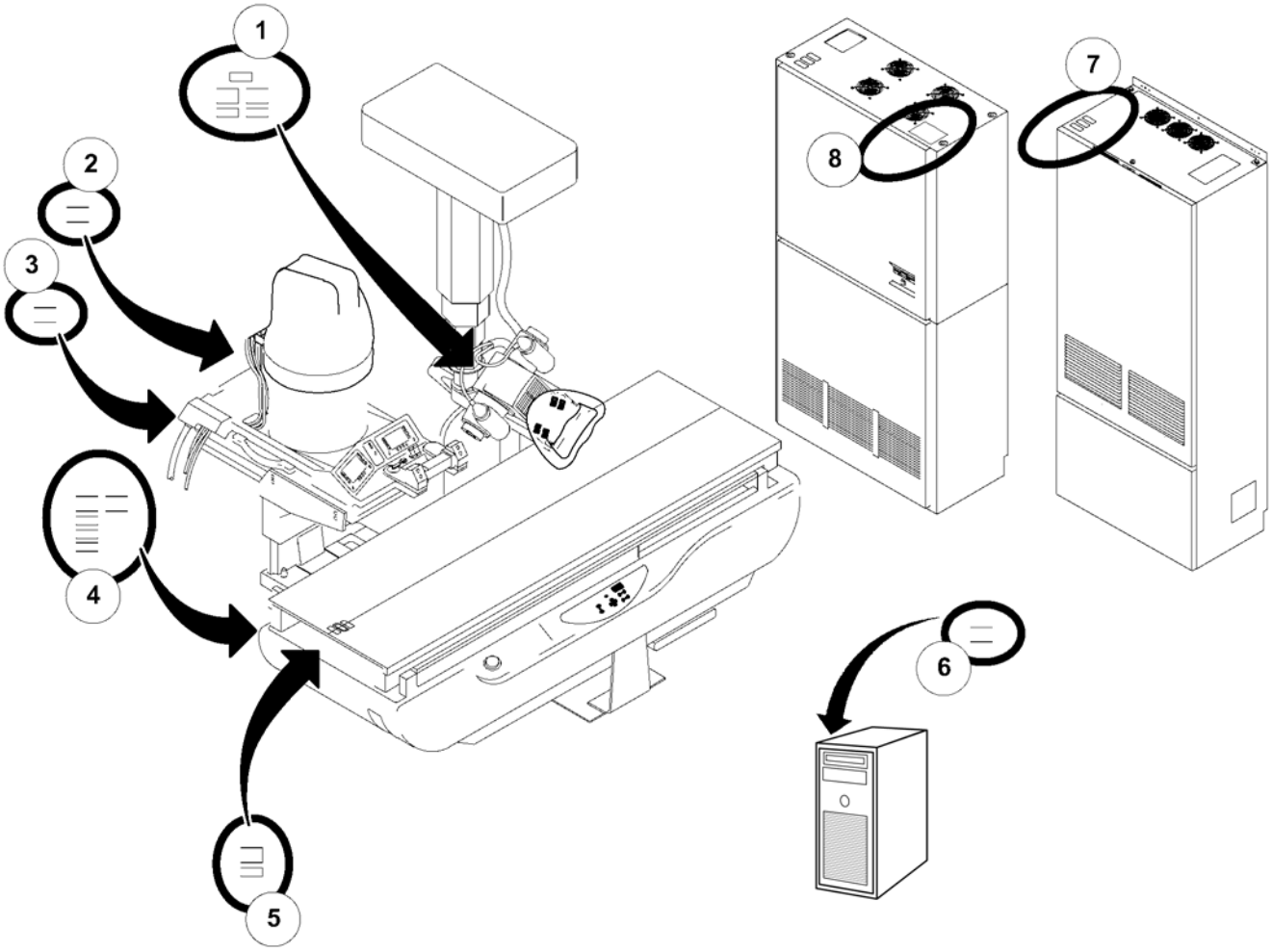
ILLUSTRATION 7-2

PRECISION 500D SYSTEM IDENTIFICATION AND COMPLIANCE PLATES

TYPICAL IDENTIFICATION PLATE

TYPICAL CSA CERTIFICATION PLATE



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1-2Identification and Compliance Plates

See ILLUSTRATION 7-2 and TABLE 7-1.

TABLE 7-1
PRECISION 500D SYSTEM IDENTIFICATION AND COMPLIANCE PLATES

Item	Component	Model Number	Plate Type
1	Suspension X–Ray MX 100 X–Ray Tube Casing	46-155400G46	Identification
	Maxiray 100–18 H.S.; Focal Spots 0.6–1.25°, 12.5°	46–155400G2	Identification
	X-ray Tube Conformance Label	46–155400G281	Identification, HHS, CE, UL, CSA
	Overhead tube Collimator	AL01C 2266999 AL01C II 5234954	Identification, CSA, UL, HHS (On collimator inside Tube assembly)
	Maxiray 100–18 H.S.; Focal Spots 0.3 – 1.0; 12.5°	46–155400G290	Identification, HHS, CE, UL, CSA
2	Image Intensifier (40 cm/16 Inch) Digital	2289147	Identification, HHS, CSA
	Image Intensifier (32 cm/12 Inch) Digital	2289148	Identification, HHS, CSA
3	Intelligent Digital Device	2403790-3	Identification
4	Precision 500D R&F Table	2403791-3	Identification, HHS, CE Label, CSA
	Precision 500D R&F Table Collimator (Undertable)	AF01A 2292592 AF01A II 5234960	Identification, HHS, CSA, CE, UL (On collimator inside table)
	Precision 500D Table Fluoro MX–100 X–Ray Tube Casing (Adjusted with 2.1° wedge)	46–155500G18	Identification
	Maxiray 100FL; Focal Spots 0.6 – 1.0; 12.5 (Fluoro)	46-155318G36	Identification
	X-ray Tube Conformance Label	46–155500G228	Identification, HHS, CE, UL, CSA (On tube inside table)
	Precision 500D Table Reciprocating Bucky	2189554	Identification (On bucky inside table)
	Precision 500D Table Cassette Size Sensing Tray	2176788	Identification (On bucky CSS tray inside table)
5	Precision 500D Table Top	46–180600G4	Identification, HHS
6	Operator Console (X-ray control if manufactured on or after Aug 17, 2007)	5117866-27	Identification
		5261130 5272650	Identification, HHS
7	Precision 500D Positioner Cabinet	2401181	Identification, CSA, CE
8	System Cabinet	5176501 5224631	Identification, CSA, CE
	JEDI Generator 65 kW, 80 kW (X-ray control if manufactured before Aug 17, 2007)	2290800	Identification, HHS, CSA, CE, IEC (Also on X-ray Generator inside cabinet)
	Digital Imaging System	2407276-2	Identification, CSA, UL (On Digital Imaging system inside cabinet)
		5174991	Identification (On digital Imaging system inside cabinet)

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TABLE 7-1 PRECISION 500D SYSTEM IDENTIFICATION AND COMPLIANCE PLATES (continued)			
9	SG–80 Vertical Bucky Stand	2402564	Identification
	SG–120 Vertical Bucky Stand	2402562	Identification
	Precision 500D Wallstand Reciprocating Bucky	2408636	Identification, CSA, CE (On bucky inside wallstand)
	Precision 500D Table Cassette Size Sensing Tray	2402669	Identification (On bucky CSS tray inside wallstand)

1-3Exposure Modes

The imaging system provides the following X–ray exposure modes.

- Digital Record
- Fluoro

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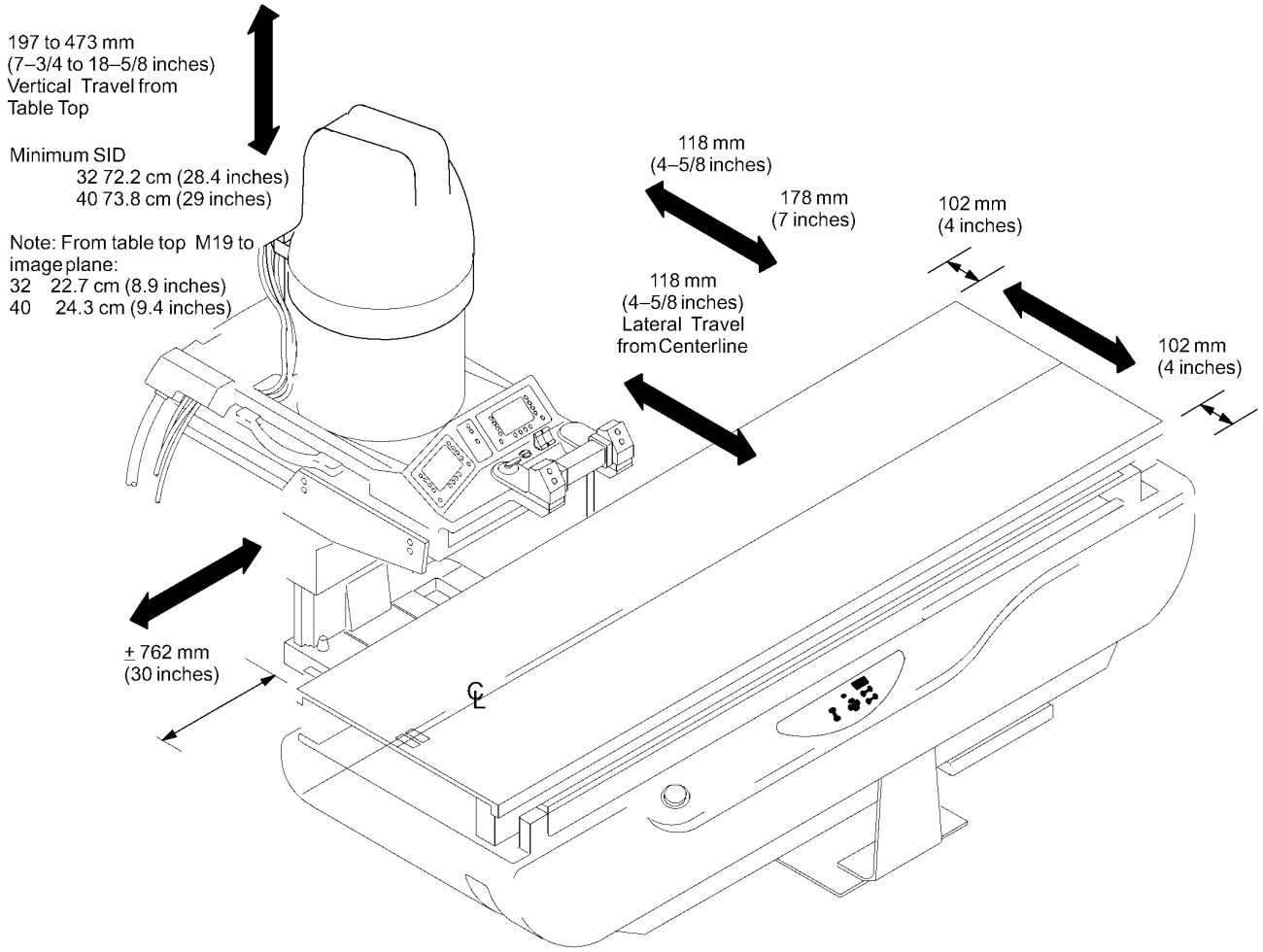
1-4Travel Specifications

ILLUSTRATION 7-3
TRAVEL SPECIFICATIONS FOR INTELLIGENT DIGITAL DEVICE AND PRECISION 500D TABLE TOP



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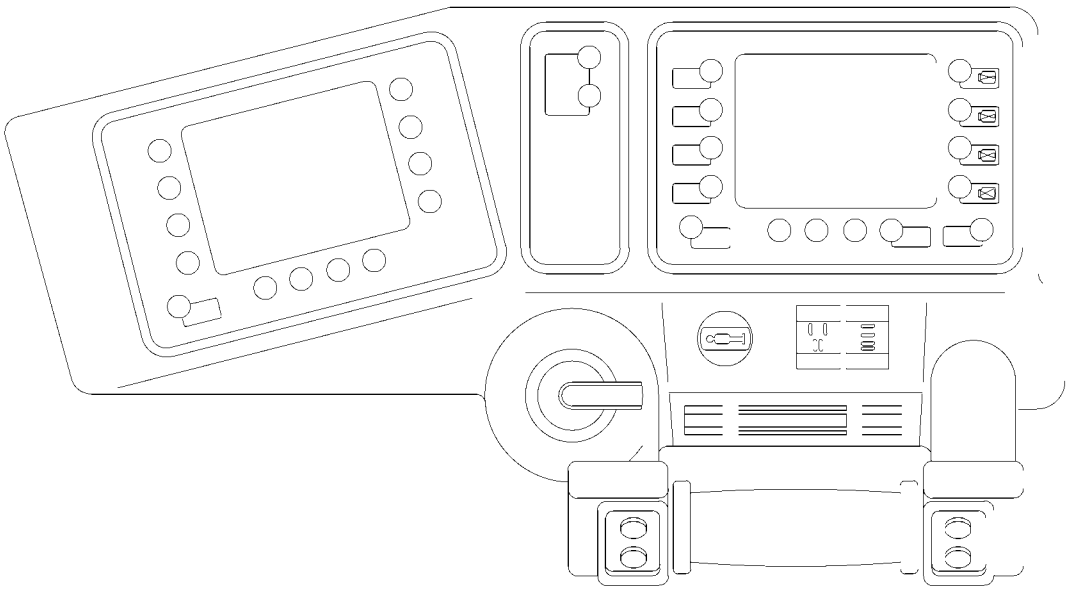
1-5Digital Operator Control Panel

Control of digital operation is from the IDD film control panel.

ILLUSTRATION 7-4
IDD OPERATOR CONTROL PANEL



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1-6Types of Radiological Examinations in Significant Zone of Occupancy

The following are the types of radiological examinations for which the Significant Zone of Occupancy is designated to be used:

NOTE: Refer to ILLUSTRATION 7-5 through ILLUSTRATION 7-10 for a definition of the area of the Zone of Occupancy and radiation curves.

- Upper Gastro–intestinal
- Barium Enema
- Intravenous Pyelography
- Pharynx/Esophogus
- Myelography
- General Fluoroscopy
- Retrograde Pyelography
- Cholangio/Panc.
- Urethro/Cysto.
- Venography – extremities
- Venography – other
- Cholecystography
- Arthrography
- Hysterosal/Pelvimetry
- Interventional Biliary/Gastro–intestinal
- Interventional Urinary Tract
- Drainage Catheter Placement
- Diskography
- Lymphangiography

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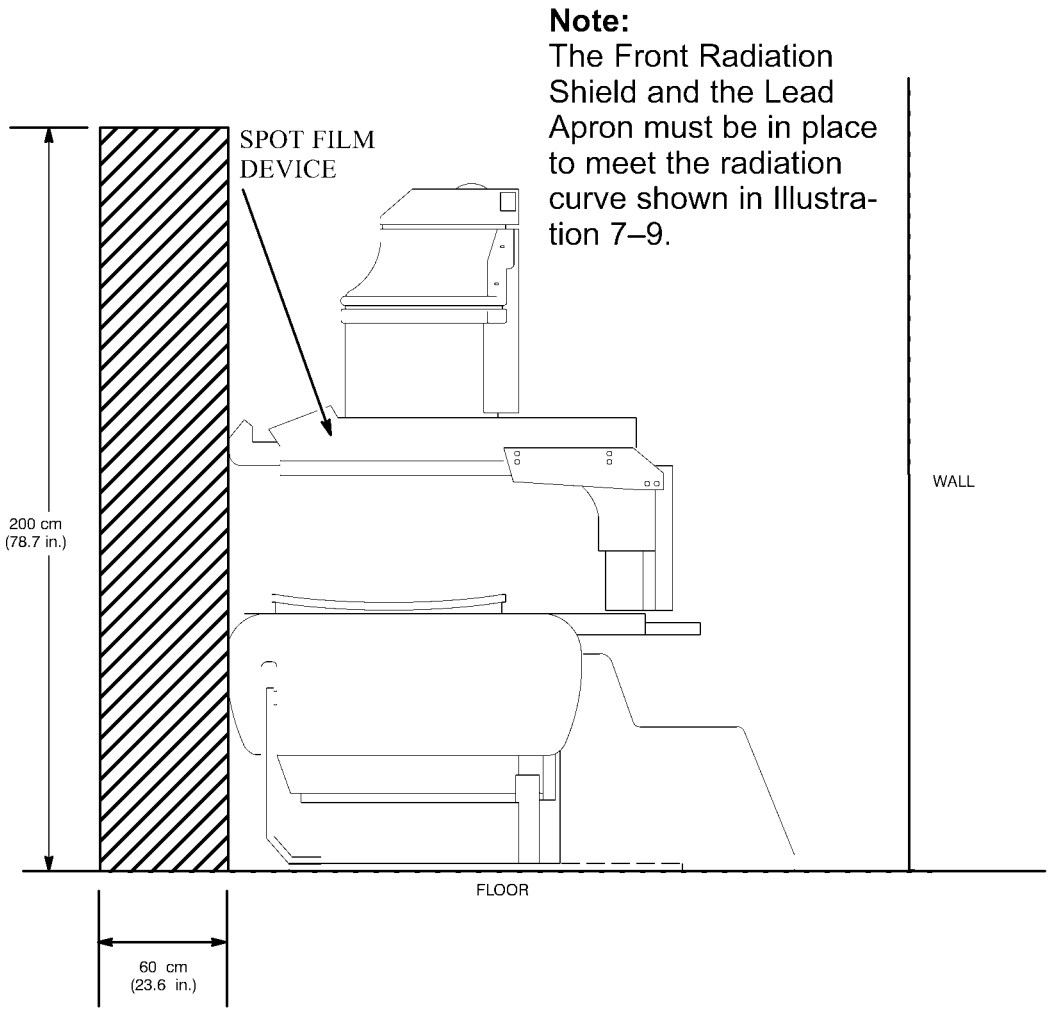
ILLUSTRATION 7-5
DESIGNATION OF SIGNIFICANT ZONE OF OCCUPANCY –TABLE HORIZONTAL


Note:
The Front Radiation Shield and the Lead Apron must be in place to meet the radiation curve shown in Illustration 7–9.
SPOT FILM DEVICE
200 cm (78.7 in.)
WALL
FLOOR
60 cm (23.6 in.)

ZONE OF OCCUPANCY

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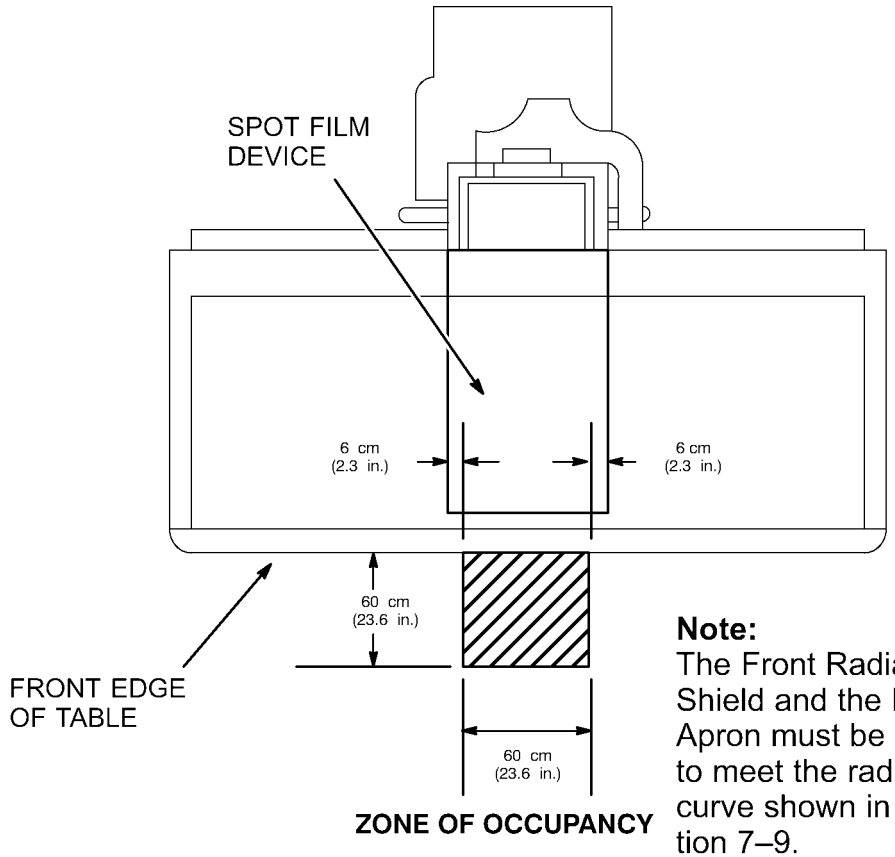
ILLUSTRATION 7-6
DESIGNATION OF SIGNIFICANT ZONE OF OCCUPANCY –TABLE HORIZONTAL (TOP DOWN VIEW)



Note:
The Front Radiation Shield and the Lead Apron must be in place to meet the radiation curve shown in Illustration 7–9.

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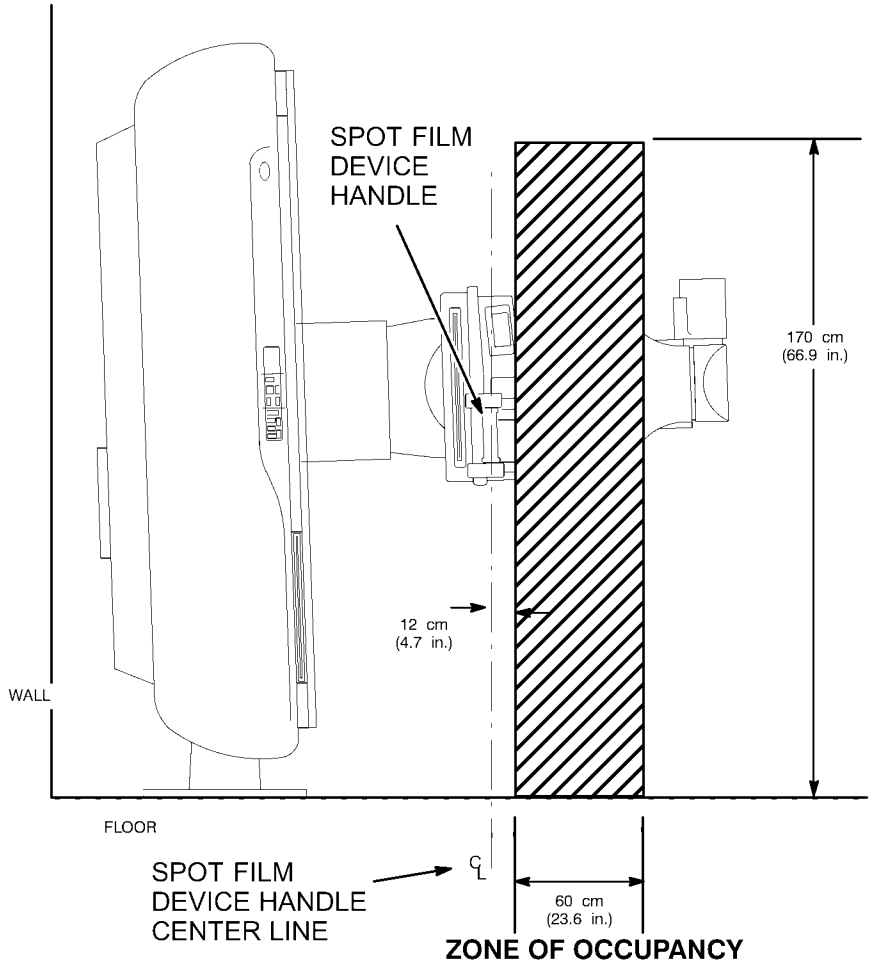
ILLUSTRATION 7-7
DESIGNATION OF SIGNIFICANT ZONE OF OCCUPANCY –TABLE VERTICAL



Note:
The Front Radiation Shield and the Lead Apron must be in place to meet the radiation curve shown in Illustration 7–10.

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ILLUSTRATION 7-8
DESIGNATION OF SIGNIFICANT ZONE OF OCCUPANCY –TABLE VERTICAL (TOP DOWN VIEW)

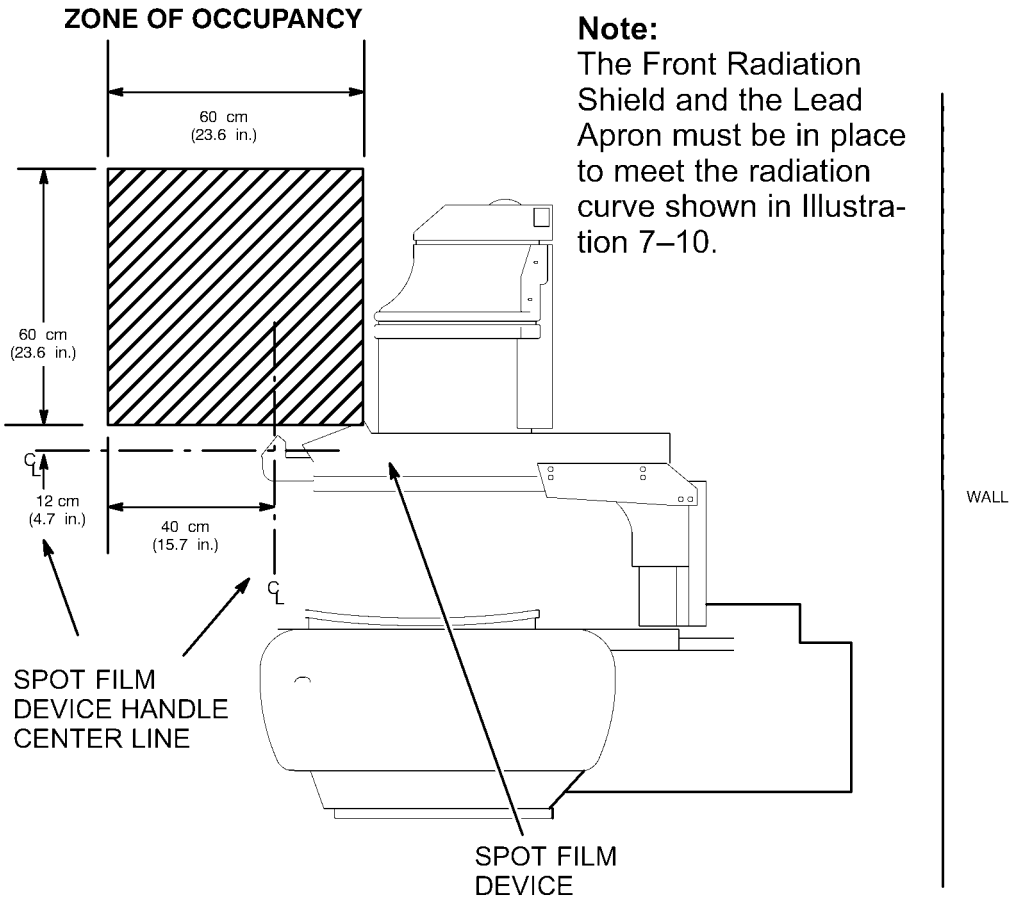

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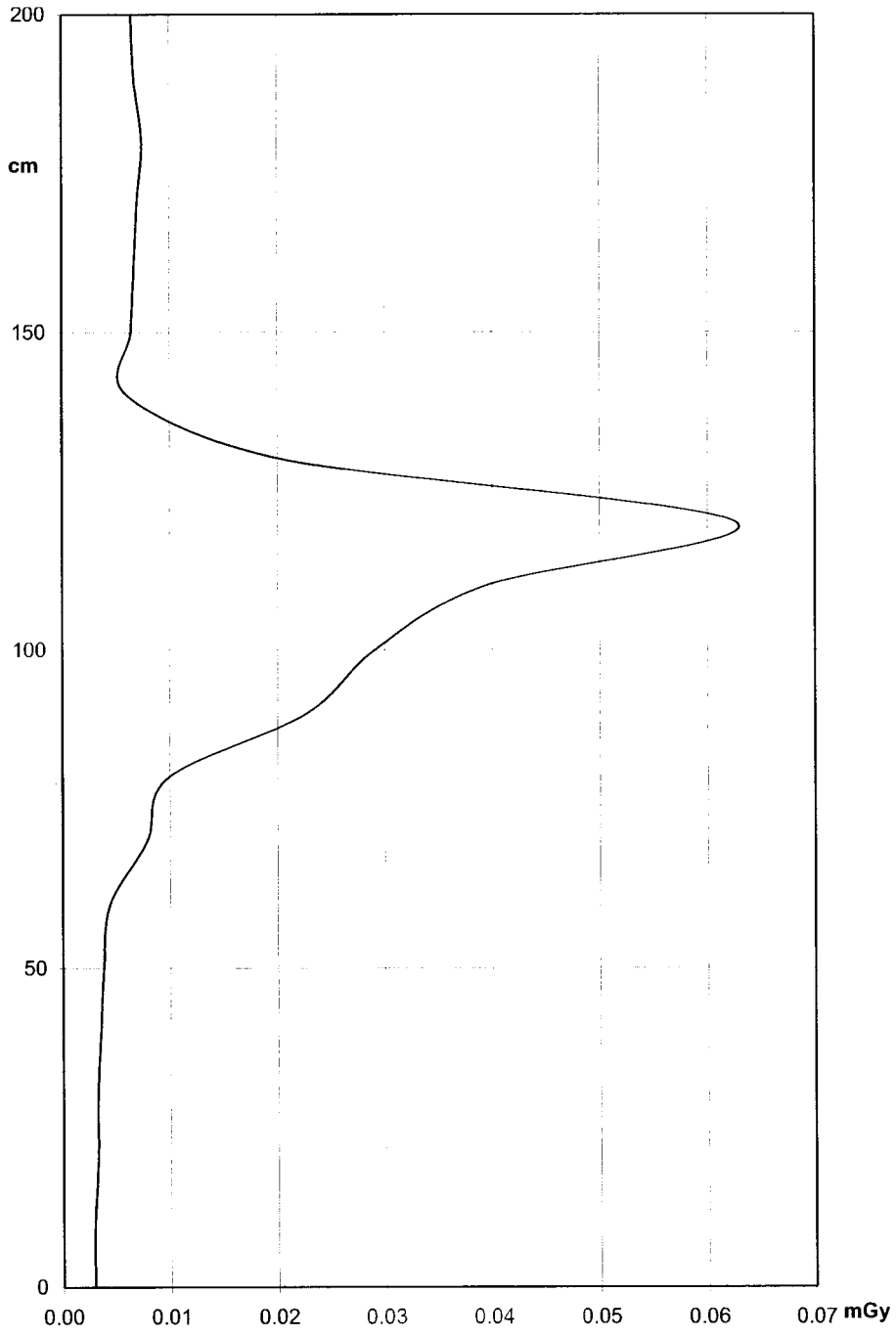
ILLUSTRATION 7-9
RADIATION CURVE TABLE HORIZONTAL



NOTE: Air Kerma in one hour normalized for a work load of 3600 mAs @ 120 kVp 3 mA.

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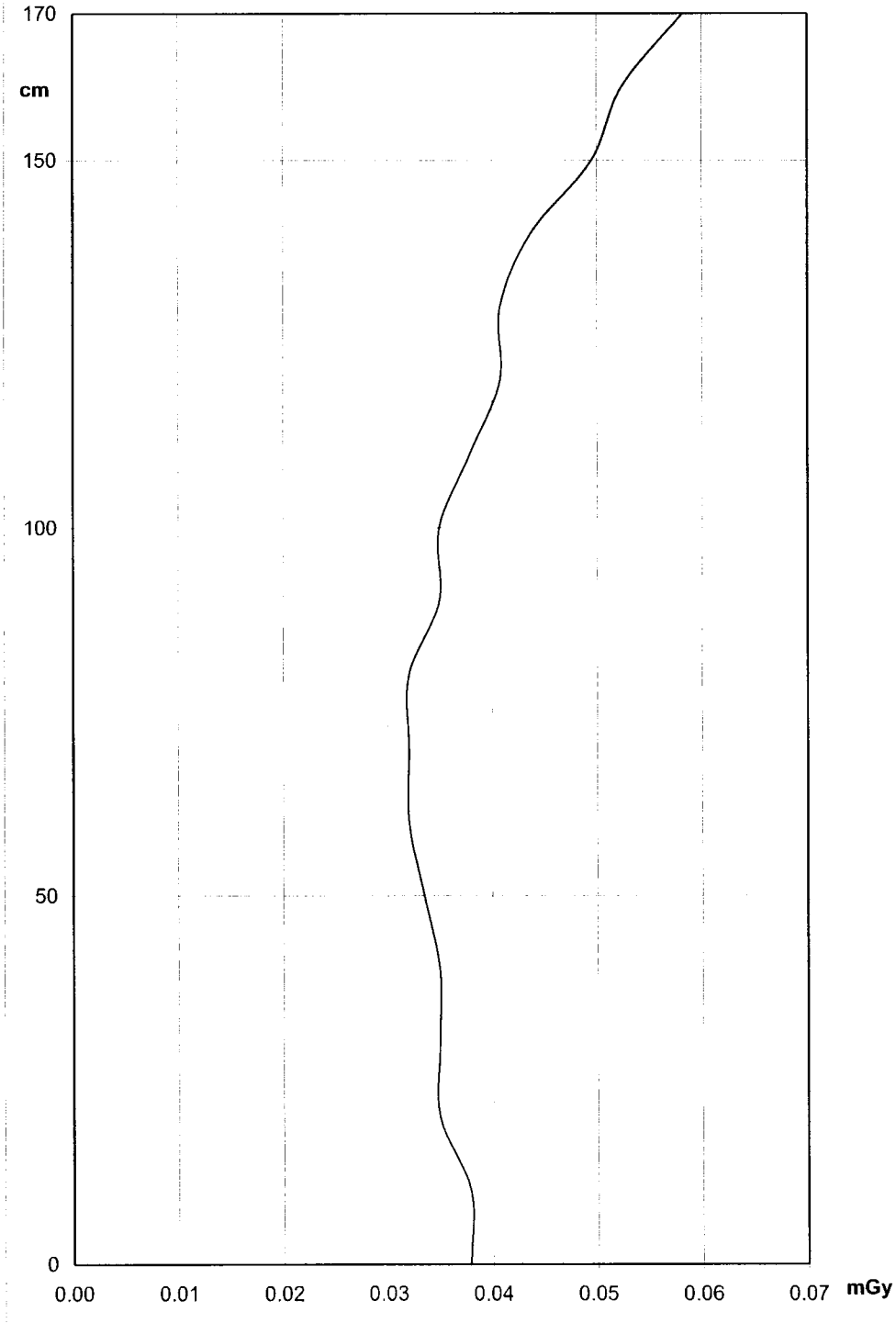
ILLUSTRATION 7-10
RADIATION CURVE TABLE VERTICAL



NOTE: Air Kerma in one hour normalized for a work load of 3600 mAs @ 120 kVp 3 mA.

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SECTION 2
OPERATOR CONTROLS AND DISPLAYS

2-1Operator Control Locations

See ILLUSTRATION 7-11.

All Table and Imaging Device operator controls, displays, and indicators are located in two basic operator control areas:

- Table Side Control Panel
- Imaging Device Operator Control Panel

ILLUSTRATION 7-11
INTELLIGENT DIGITAL DEVICE
A TABLE OPERATOR CONTROL PANEL LOCATIONS

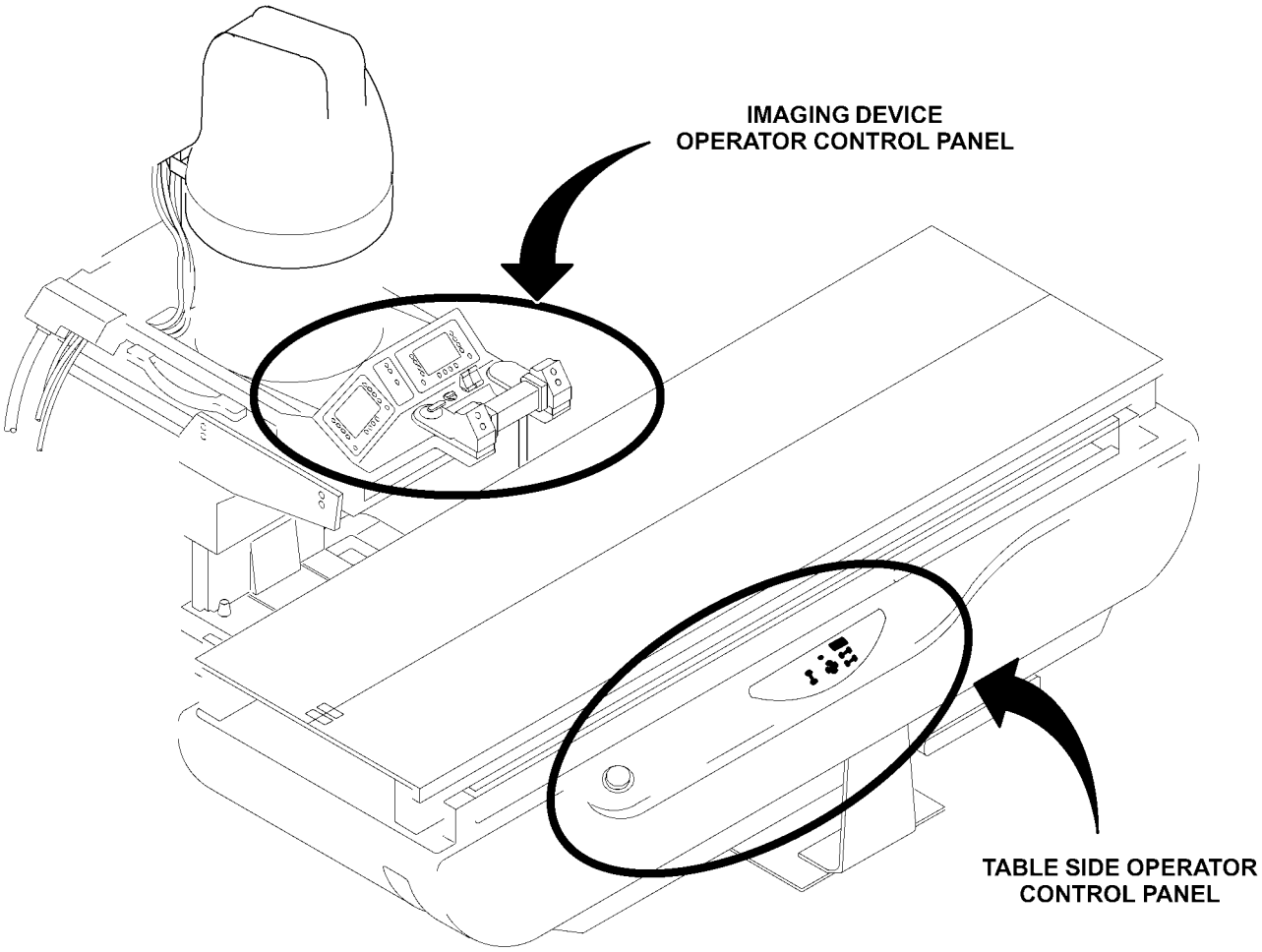

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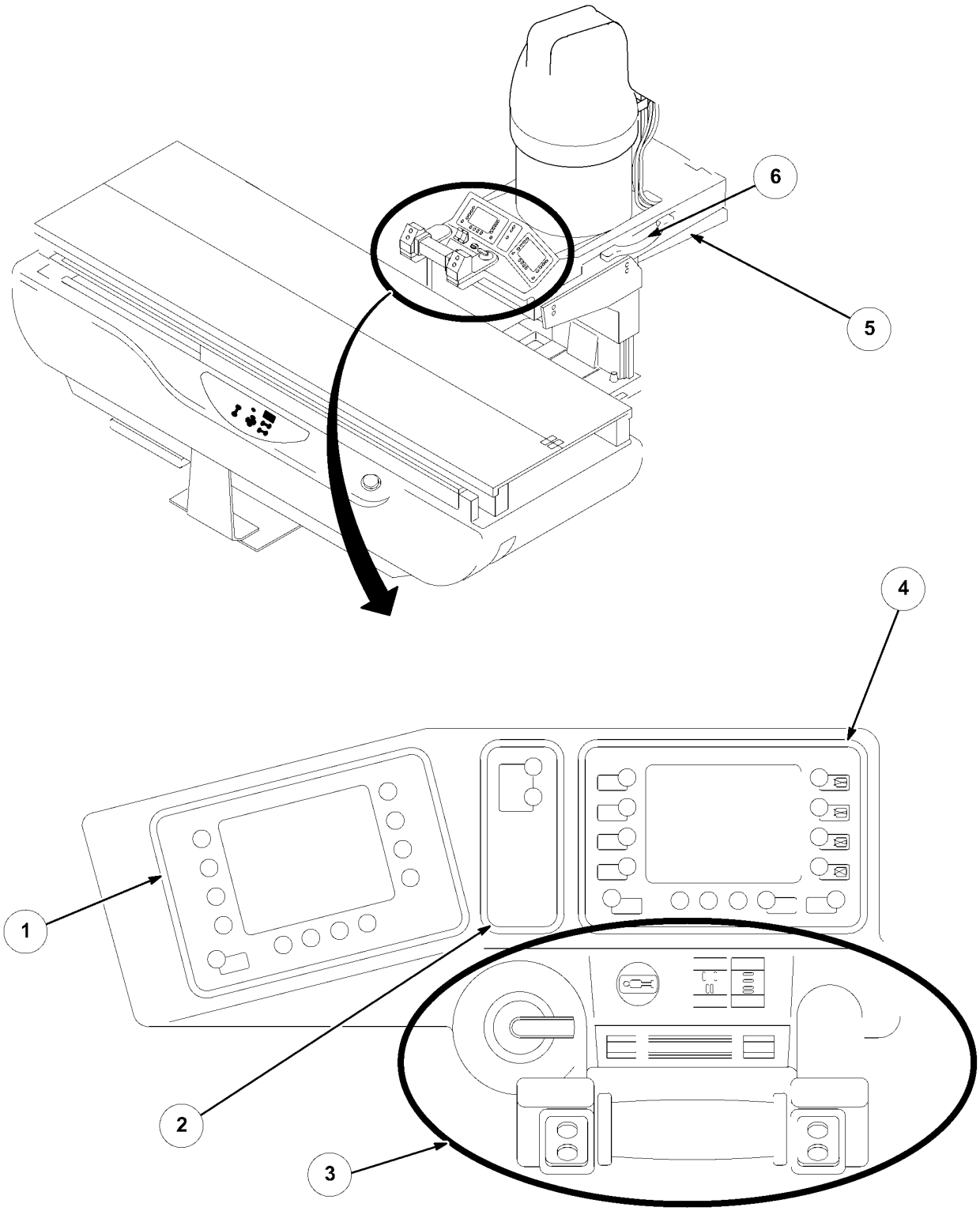
ILLUSTRATION 7-12
IDD OPERATOR CONTROLS – MAIN GROUPS



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2-2Imaging Device Operator Controls and Displays – Overview

See ILLUSTRATION 7-12 and TABLE 7-2.

TABLE 7-2
IMAGING DEVICE OPERATOR CONTROLS – MAIN GROUPS

Item	Name	Description	Notes
1	Auxiliary Digital Operator Console	Provides: • Advisory ,essage display. • Digital Controls. • Contrast modifier operator controls.	
2	Fluoro Presentation Operator Console	Provides: • Video reversal selectrions (VERTICAL, HORIZONTAL)	
3	Multi-function Operator Control Group	Provides: • Table angulation control. • Table Top Eight-Way Drive Control. • Power Assist Digital Carriage Handle. • X-Ray field size (collimator blades) controls. • X-Ray Fluoroscopy exposure controls (4). • X-Ray Record exposure controls (3).	
4	Main Digital Operator Console	Provides: • Various Digital Controls (Locks, Cone, Grid). • Record Mode selections (Digital, VTR). • MAN collimator blade control selection. • Fluoro Field of View selections. • System status displaus (X-Ray ON, HEAT WAIT, Flu-oro Time remaining) • Fluoro and Record technique display (Optional) • Collimator position display (Optional)	Technique Displays are available with the **Technique Adjust** Options. Collimator position display is available with the **Virtual Collimation** Option.
5	Digital Device Carriage Lock Lever	Provides operator lock control of Digital Device carriage in either PARK or over-table positions.	
6	Digital Device Carriage Grasp Handles	Provides operator handles to aid in moving Digital carriage.	

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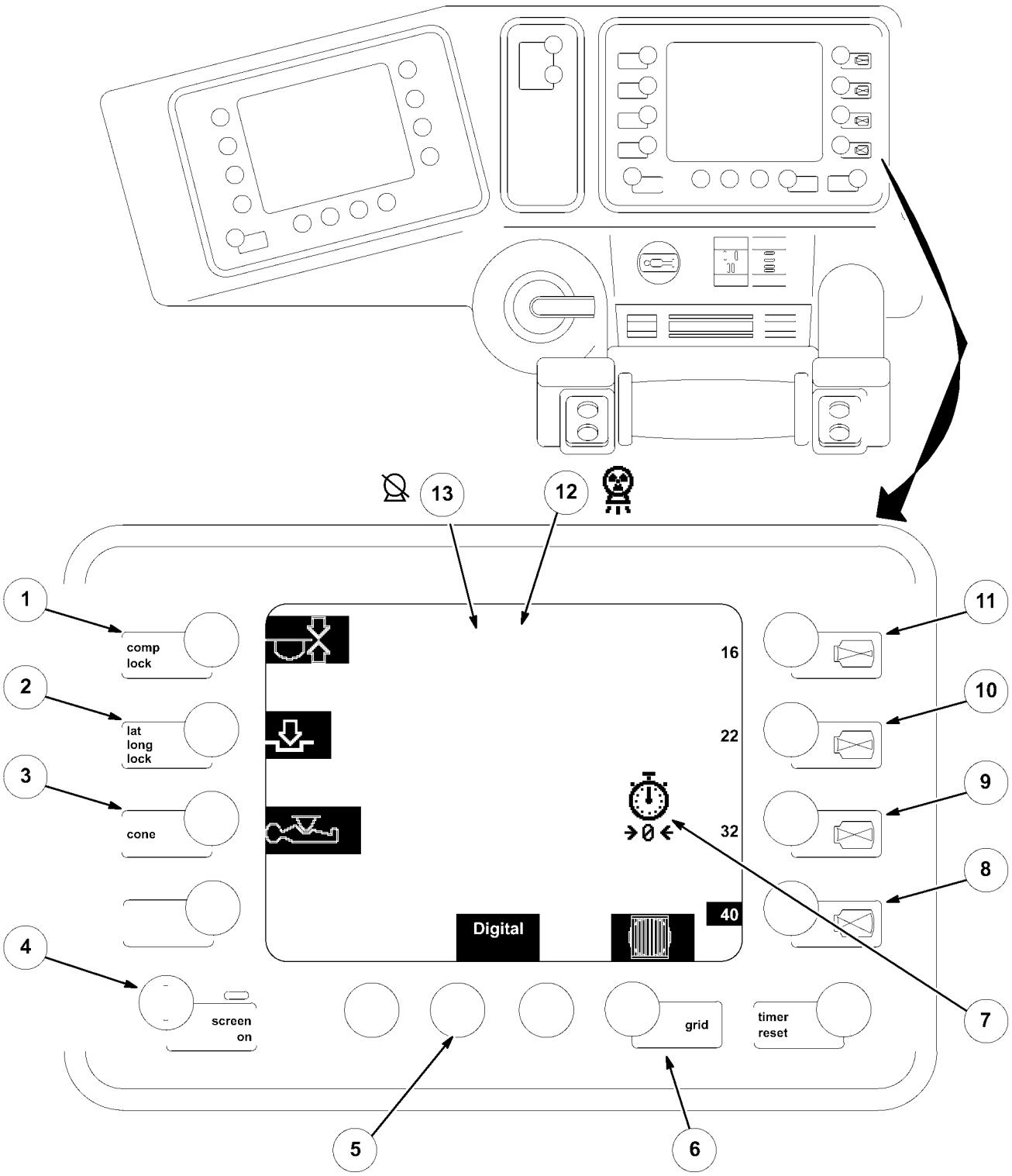
ILLUSTRATION 7-13
MAIN OPERATOR CONSOLE SCREEN – BASIC CONTROLS AND DISPLAYS



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2-3Main Operator Console Screen

2-3-1 Main Operator Console Screen –Basic Controls and Displays

See ILLUSTRATION 7-13 and TABLE 7-3.

TABLE 7-3
MAIN OPERATOR CONSOLE SCREEN – BASIC CONTROLS AND DISPLAYS

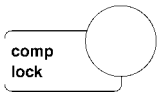
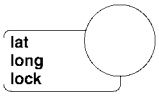
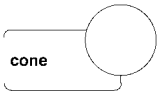
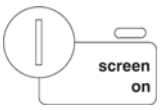
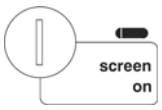
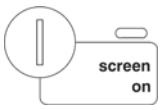
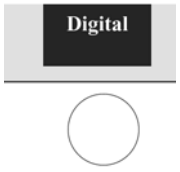
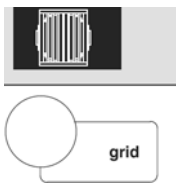
Item	Operator Control	Activated Display	De-Activated Display	Description	Notes
1				Press to lock or unlock the vertical position of the imaging device.	Power Assist does not override the compression lock.
2				Press to apply or release both the lateral and longitudinal imaging device tower locks.	Power Assist overrides the lateral and longitudinal locks.
3				Press to move: • The compression cone from the park position into the field of view, or • The compression cone to the park position from the field of view.	The cone drive is disabled when the Table Horizontal Stop is OFF. The cone may be moved during Fluoroscopy. X-Ray record exposures are inhibited while cone is in motion.
4				Press to turn on Operator console screen displays.	Console screen blanks after 15 minutes of inactivity.
5				Press to select digital mode of operation. If pulsed, fluoro option is available pressing will toggle between fluoro modes. Selecting Digital deactivates the other mode elections.	Digital now standard.
6				Press to move grid into field of view. Icon may be flashing when not in preferred position (set during installation).	The grid may be moved during Fluoroscopy. X-Ray record exposures are inhibited while grid is in motion.

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TABLE 7-3 (CONTINUED)
MAIN OPERATOR CONSOLE SCREEN – BASIC CONTROLS AND DISPLAYS

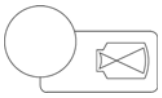
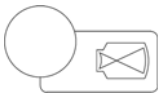
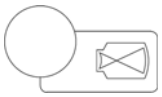
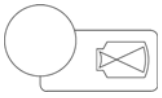
Item	Operator Control	Activated Display	De-Activated Display	Description	Notes
7				Fluoro Timer Display. Flashing display starts after 4.8 minutes of fluoroscopy.	Displays only during Fluoro acquisition.
8			**40** **32**	Press to select FULL or largest field of view. Deselects other FOV selections.	Field size display depends on size of Image Intensifier. 40 cm (16 inch), 30 cm (12 inch)
9			**32** **22**	Press to select MAG 1 field of view. Deselects other FOV selections.	Field size display depends on size of Image Intensifier. 40 cm (16 inch), 30 cm (12 inch)
10			**22** **16**	Press to select MAG 2 field of view. Deselects other FOV selections.	Field size display depends on size of Image Intensifier. 40 cm (16 inch), 30 cm (12 inch)
11			**16** **12**	Press to select MAG 3 field of view. Deselects other FOV selections.	Field size display depends on size of Image Intensifier. 40 cm (16 inch), 30 cm (12inch)
12				Indicator Display. Indicates Xray exposures are in progress.	
13				Exposure Hold.	Message(s) stating reason for exposure hold will be displayed on left console.

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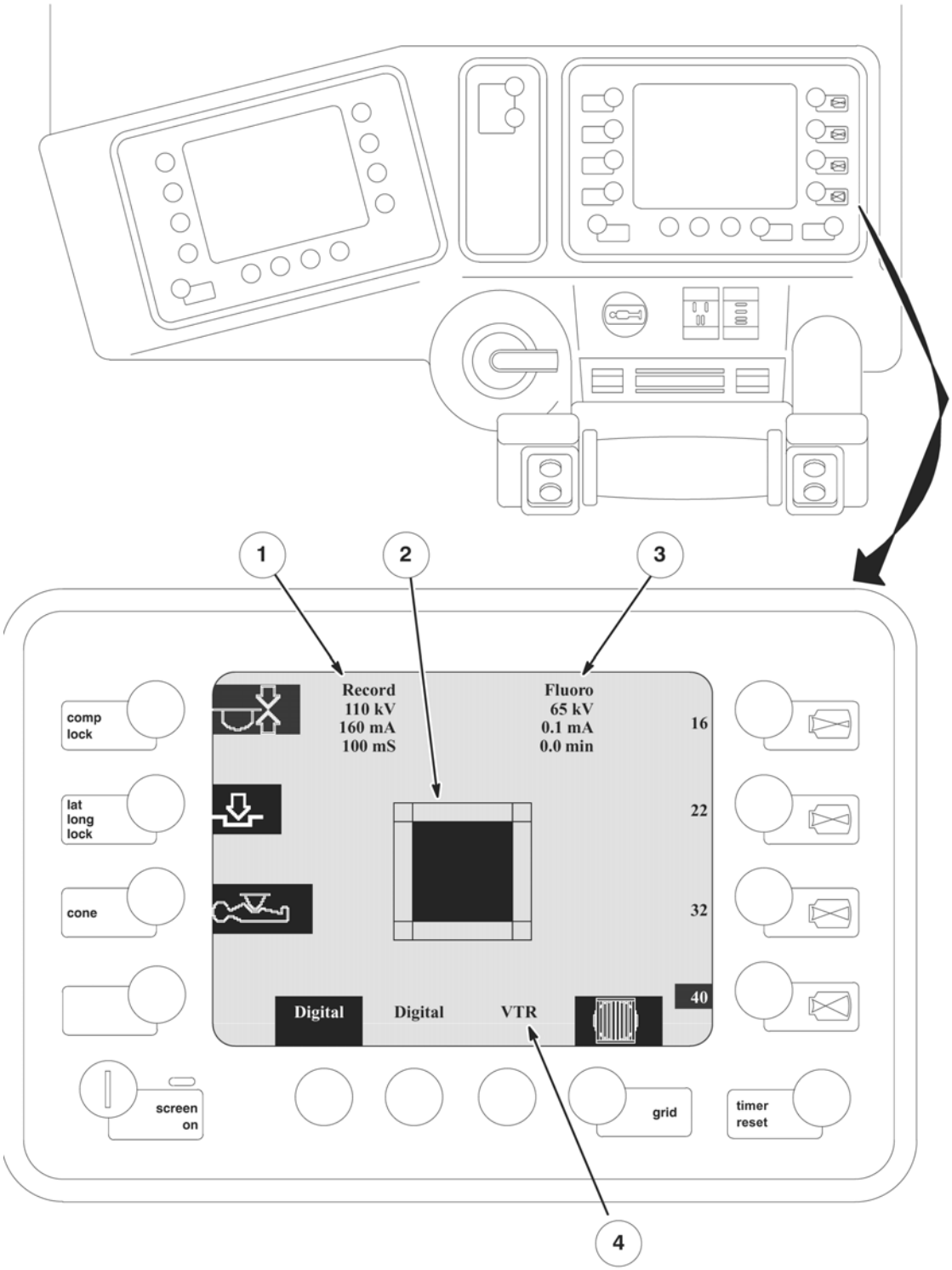
ILLUSTRATION 7-14
MAIN OPERATOR CONSOLE SCREEN – OPTIONAL CONTROLS AND DISPLAYS



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2-3-2 Main Operator Console Screen –Optional Controls and Displays

See ILLUSTRATION 7-14 and TABLE 7-4.

TABLE 7-4 **MAIN SPOT FILM/DIGITAL OPERATOR CONSOLE – OPTIONAL CONTROLS AND DISPLAYS**

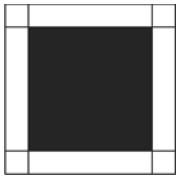
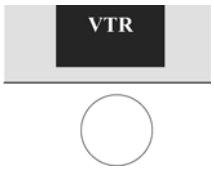
Item	Operator Control	Activated Display	De-activated Display	Description	Notes
1		**Record** **110 kV** **160 mA** **100 mS**		Displays: • Record kV. • Record mA. • Displays exposure time from the last exposure to the nearest millisecond.	Available with **Technique Adjust** or **APR** Options.
2				Display simulates actual collimated X-Ray field size (collimator blade position). Dimensions are relative to the full field available (FOV).	Available with **Virtual Collimation** Option.
3		**Fluoro** **65 kV** **0.1 mA** **0.0 min**		Displays: • Actual Fluoroscopic kV during Fluoro acquisition. • Selected Fluoroscopic kV during inactivity. • Actual Fluoroscopic mA only during Fluoroscopy. • Total cumulative fluoro exposure time from the last time that the total fluoro timer was reset.	Available with **Technique Adjust**.
4			**VTR**	Press to select or de-select video tape recording (or VCR recording) of fluoroscopy.	Available with **VTR/VCR** Option.
5				• Press to Icon Ped or Adult mode.	Available with Pediatric option only.

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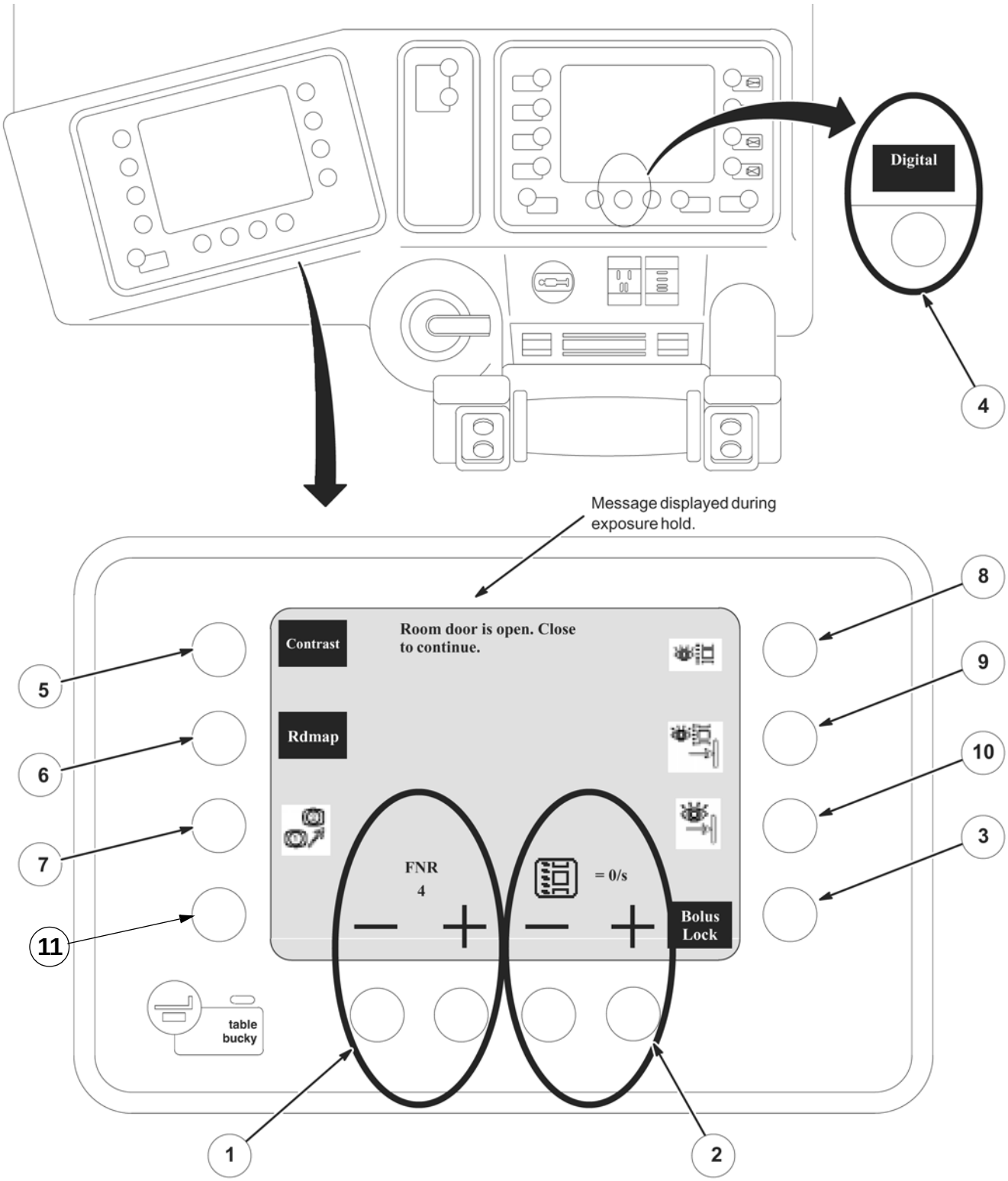
ILLUSTRATION 7-15
AUXILIARY DIGITAL OPERATOR CONSOLE



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2-3-3 Auxiliary Digital Operator Console

See ILLUSTRATION 7-15 and TABLE 7-5.

TABLE 7-5
AUXILIARY DIGITAL OPERATOR CONSOLE

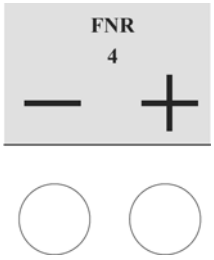
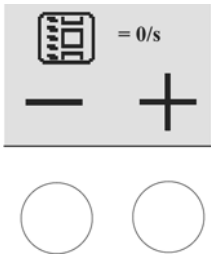
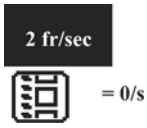
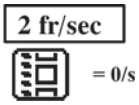
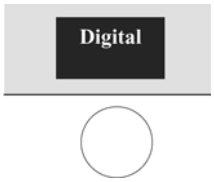
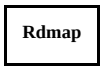
Item	Operator Control	Activated Display	De-Activated Display	Description	Notes
1		**FNR 4**	**FNR 4**	Press to increase or decrease Digital record Fluoro Noise Reduction (FNR).	Digital FNR selections range from 0 to 6. Use with Fluoro Detail to optimize image quality and reduce patient or operator dose. See Digital Operator Manual for more information about the FNR feature.
2				Press to increase or decrease Digital record frame rate in frames per second. If a multi-frame rate is selected before prep, the selected digital record frame rate may be adjusted during the run.	Digital frame rate selections range from 0 (single exposure) to 7.5 frames per second. See Digital Operator Manual for more information about frame rate selections.
3			**Bolus Lock**	Disables one of the following combinations of IDD locks during a Digital PREP and EXPOSE cycle: • Longitudinal Lock • Lateral and Longitudinal Locks • Longitudinal and Compression Locks	Select your preferred lock disable combination during installation.
4			**Digital**	Press to select digital mode of operation. Changes Auxiliary Console to Digital Option Controls and Displays.	
5				Press to select the appropriate contrast media for current study.	Optional display.
6				Press to select subtracted fluoro, maximum opacified roadmap and landmark.	Available with **Angio** Option.

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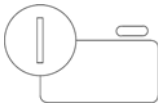
TABLE 7-5 (CONTINUED)
AUXILIARY DIGITAL OPERATOR CONSOLE

Item	Operator Control	Activated Display	De-Activated Display	Description	Notes
7				Press to move the last image hold (LIH) on monitor 1 to monitor 2 as a reference image. This image will remain on monitor 2 until another image is transferred. (Images are not saved to hard disk). Press to remove the last image hold (LIH) from monitor 1 to monitor 2.	Available with **2 Monitor** option.
8				Press to activate Fluoro Loop Acquire. Selection will highlight. When Fluoro is started, fluoro images are stored to image RAM. Depending on the system configuration, a maximum of 128 images (4 secs at 30 frames per second) or a maximum of 256 images (8 secs at 30 frames per second) are stored. By pressing the fluoro pedal again this loop willl be overwritten if not saved to hard disk. When fluoro is stopped, the acquired loop will be automatically begin playback in order to review the loop. CAUTION: The loop has not been stored to hard disk at this point. The user must press the Fluoro Loop Store button (described below) in order to permanently save the fluoro loop to the hard disk.	Optional Feature
9				Selection will appear after a fluoro loop has been acquired. Pres to transfer to hard drive from RAM memory **Note:** Fluoro cannot be performed during transfer; information will be lost.	
10				Selection will appear after Fluoro. This will save and number the current last image hold (LIH) to the hard drive.	
11				Changes frames per second for host Fluoro. **Note:** If pulsed Fluoro is selected, the default f/s is displayed.	When button is pressed, host Fluoro will cycle through the selections: 15, 7.5, 3.75.
12				Selecting this button will switch the system from fluoro to the first OTS films. By pressing it again, it will cycle through the protocol.	

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2-4Digital Fluoro Presentation Operator Console

See TABLE 7-6.

TABLE 7-6
DIGITAL FLUORO PRESENTATION OPERATOR CONSOLE CONTROLS AND DISPLAYS

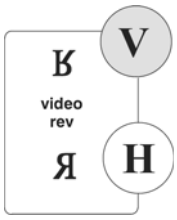
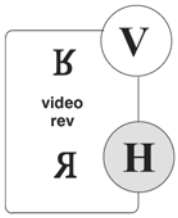
Item	Operator Control	Activated Display	De-Activated Display	Description	Notes
1				Press **V** to vertically reverse fluoroscopy video presentation.	Active when X–Rays are OFF.
2				Press **H** to horizontally reverse fluoroscopy video presentation.	Active when X–Rays are OFF.

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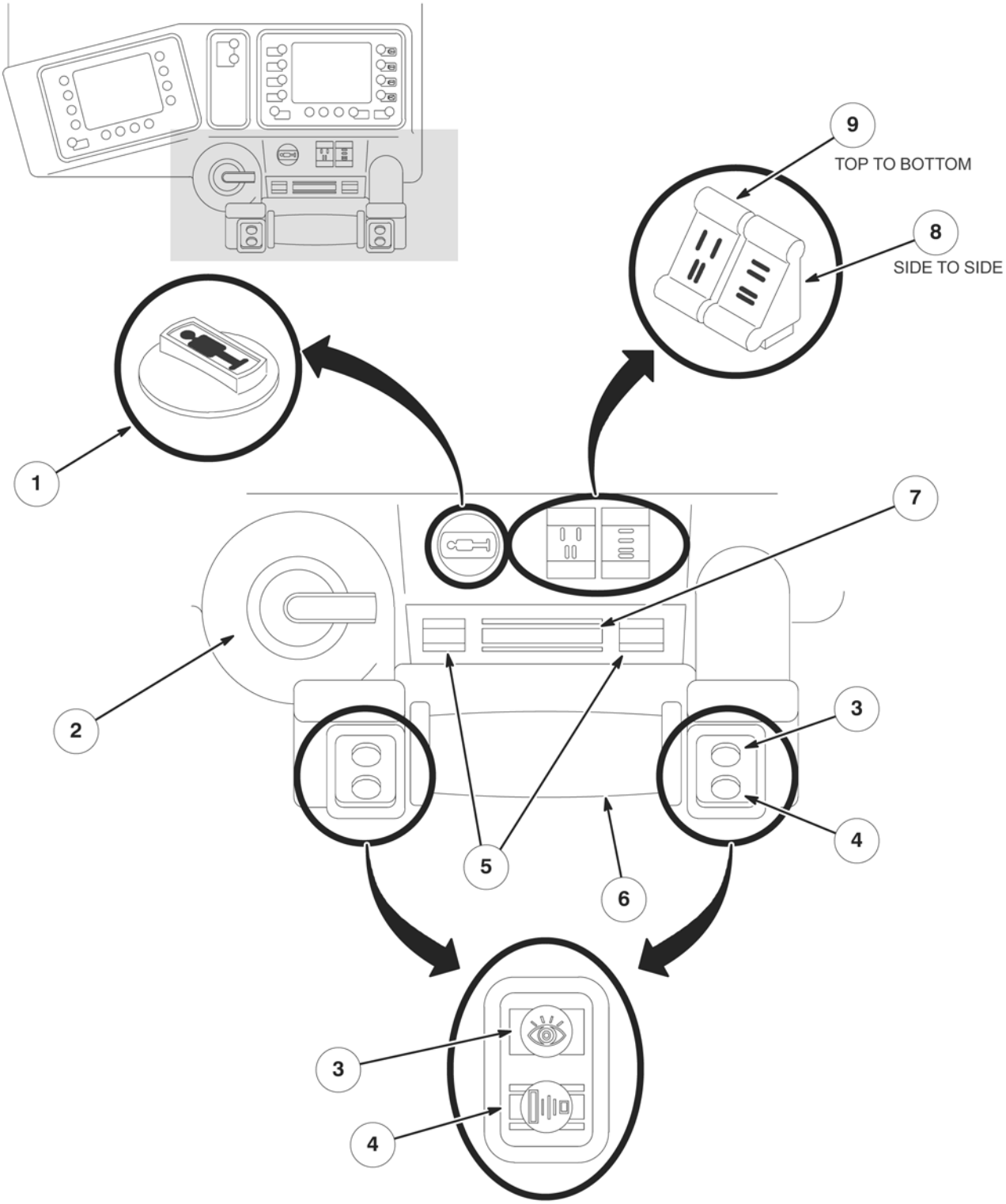
ILLUSTRATION 7-16
DIGITAL MULTI-FUNCTION OPERATOR CONTROL GROUP CONTROLS



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2-5Digital Multi-Function OperatorCon-trol Group

See ILLUSTRATION 7-16 and TABLE 7-7.

TABLE 7-7
DIGITAL MULTI-FUNCTION OPERATOR CONTROL GROUP CONTROLS

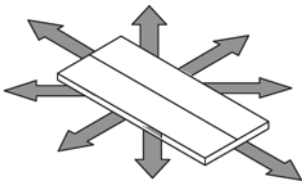
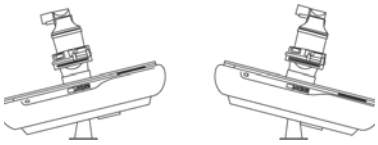
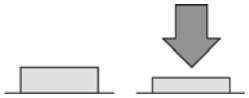
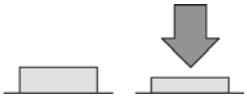
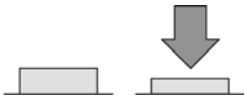
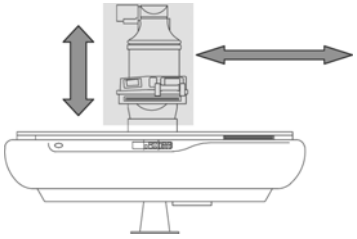
Item	Operator Control	Motion	Description
1			Eight-Way Table Top Drive Control. Move control in any of eight directions to drive table top in desired direction: • head-to-foot • front-to-rear • oblique
2			Variable speed Table Tilt Control. Rotate Control: • **CCW** to tilt table Trendelenburg. • **CW** to tilt table Vertically.
3			Fluoroscopy Exposure Control portion of Integrated Fluoro and Expose switch. Use for rapid fluoroscopy. Press to initiate Fluoroscopy (may be used with foot switch). Record EXPOSE may be initiated if this switch and the PREP + EXPOSE bar is pressed (item 7).
4			Radiographic Exposure Control portion of Integrated Fluoro and Expose switch. Use for rapid digital record exposures. Press to initiate both PREP + EXPOSE cycle.
5			Fluoroscopy Exposure Control switch (2). May be used with foot switch. Record EXPOSE may be initiated if this switch and the PREP + EXPOSE bar is pressed (item 7).
6			Variable speed Power Assist Handle. Grasp to move IDD vertically or longitudinally. Longitudinal and Vertical motion is de-activated: • During EXPOSE. Panning motion allowed during PREP/EXPOSE cycle using **Bolus Lock**. Vertical motion is also de-activated: • While parking IDD (within 20 mm of maximum SID. • When IDD is parked. • When Compression Lock is activated.

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TABLE 7-7 (CONTINUED)\
DIGITAL MULTI-FUNCTION OPERATOR CONTROL GROUP CONTROLS

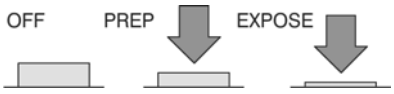
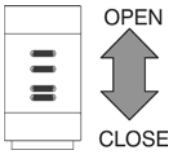
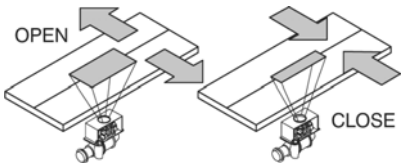
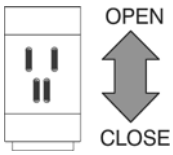
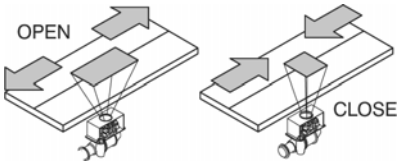
Item	Operator Control	Motion	Description
7			PREP + EXPOSE bar. Press to initiate PREP + EXPOSE cycle. Two Activate Positions: 1. PREP Position (Bar depressed to 1st click): • Heats Tube filament and brings Tube anode up to exposure speed. • Initiates digital exposures if the Fluoro Exposure Controls are also depressed (items 3 or 5). 2. EXPOSE Position (Bar completely depressed): • Initiates digital exposures. Two De-Activate Positions: 1. PREP Position (Bar released to 1st click): •Allows completion of exposure sequence. 2. OFF Position (Bar completely released): •Terminates exposures immediately.
8			Manual Lateral Collimator Blades Control. Move control in OPEN or CLOSED direction for leftto-right X-Ray field size adjustments: Maximum collimator aperture opening: • Size of selected format field • Size of selected Field of View (fluoroscopy).
9			Manual Longitudinal Collimator Blades Control. Move control in OPEN or CLOSED direction for head-to-foot X-Ray field size adjustments: Maximum collimator aperture opening: • Size of selected format field • Size of selected Field of View (fluoroscopy).

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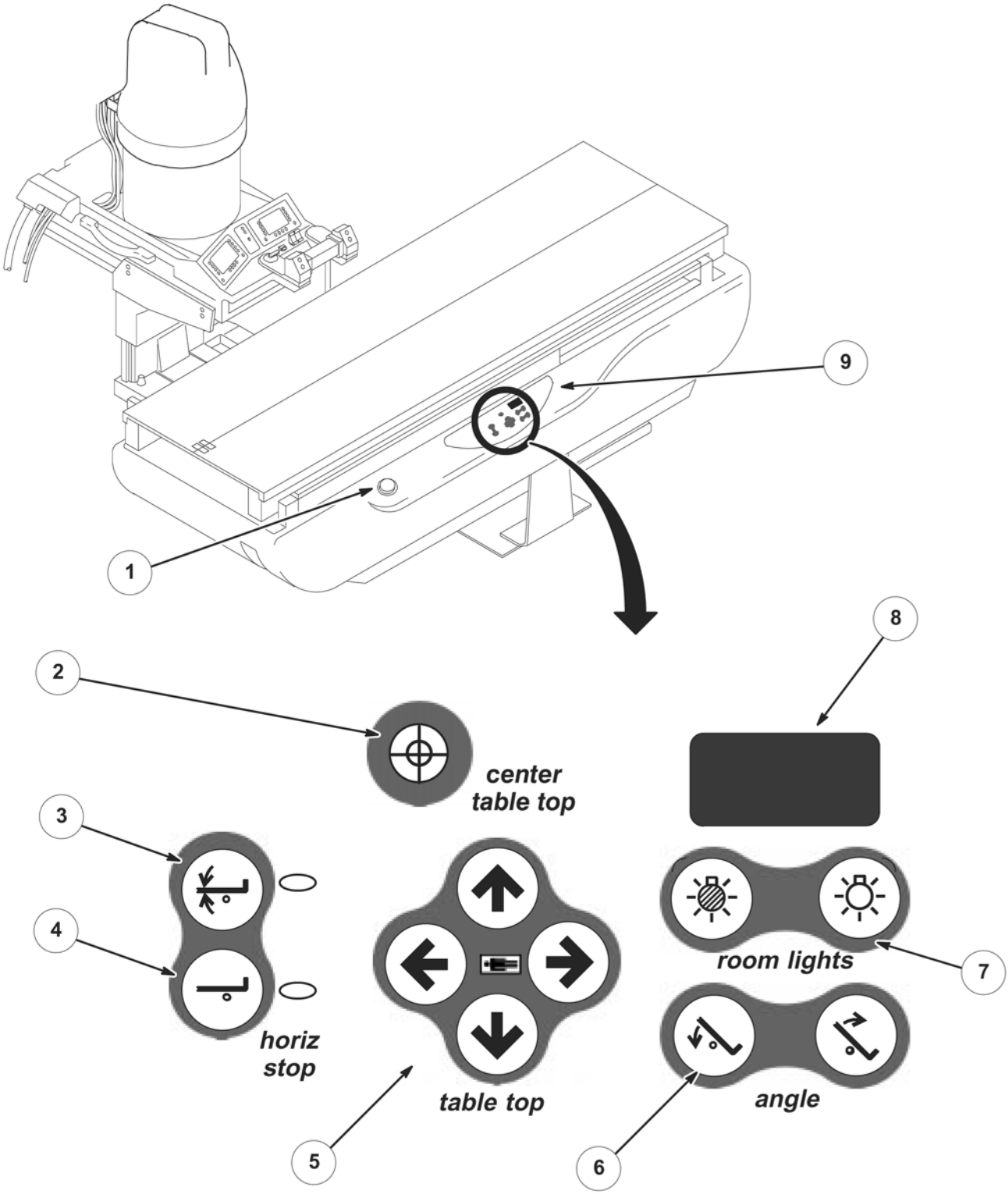
ILLUSTRATION 7-17
PRECISION 500D TABLE OPERATOR CONTROLS AND DISPLAYS



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2-6Precision 500D Table Operator Controls and Displays

See ILLUSTRATION 7-17 and TABLE 7-8.

TABLE 7-8
PRECISION 500D TABLE OPERATOR CONTROLS AND DISPLAYS

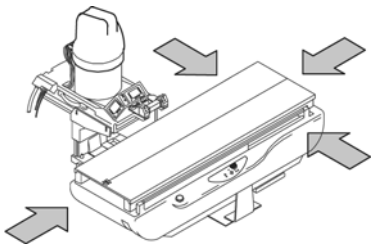
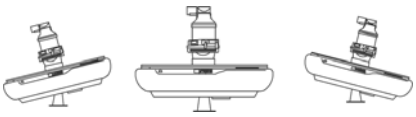
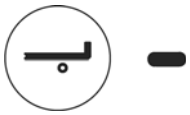
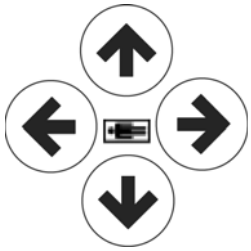
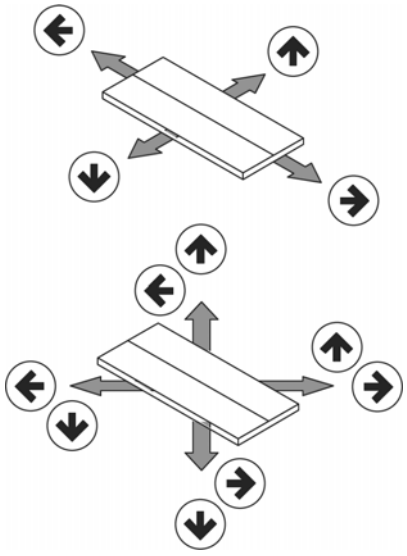
Item	Operator Control	Motion	Description
1			Emergency **STOP** Button. Press to turn **OFF** table power. Turn and release button to restore table power.
2			Press to move table top to center position.
3			Press to stop table tilt motion at the horizontal position. Light indicates HORIZ STOP is active.
4			Press to allow table to tilt through the horizontal position. Light indicates HORIZ STOP OFF is active.
5			Press individual button to drive table top in desired direction: • head-to-foot • front-to-rear Simultaneously press two-button combinations to drive table top in desired oblique direction.

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ILLUSTRATION 7-17 (CONTINUED)
PRECISION 500D TABLE OPERATOR CONTROLS AND DISPLAYS

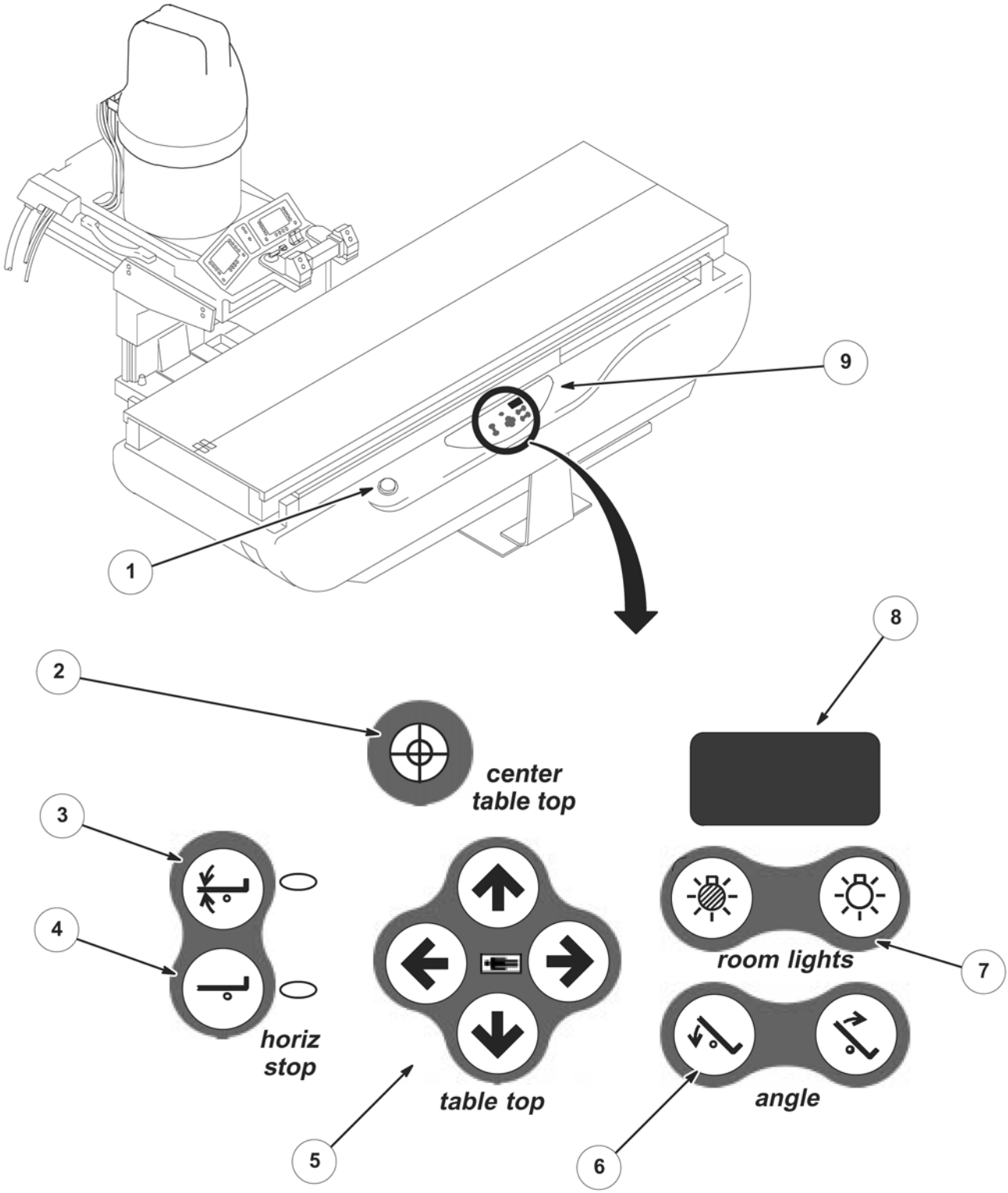

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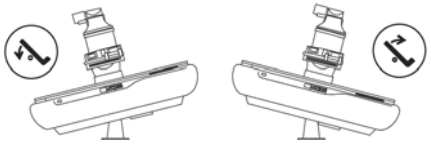
TABLE 7-8 (CONTINUED)
PRECISION 500D TABLE OPERATOR CONTROLS AND DISPLAYS

Item	Operator Control	Motion	Description
6			Press individual button to tilt table top in desired direction.
7			Press to dim room lights. Press to brighten room lights. Available as an Option.
8			Displays table tilt angle in degrees from the horizontal position. • + indicates vertical motion. • – indicates Trendelenburg motion.

Section 3
SYSTEM SPECIFICATIONS

3-1Precision 500D Table Specifications

Product specifications for the Precision 500D Table are shown in TABLE 7-9.

TABLE 7-9
PRECISION 500D TABLE SPECIFICATIONS

Table Travel	Longitudinal Travel	60” (152.4 cm)
	Longitudinal Travel (either side of center)	30” ± 0.75” (76.2 cm ± 1.9 cm)
	Lateral Travel (either side of center)	3.88” ± 0.12” (9.85 cm ± 0.3 cm)
	Angulation Speed	
	Precision 500D 90/30	0° to 4.0° (± 0.5°) / second 120°: 90° vertical to 30° Trendelenburg
	Precision 500D 90/15	0° to 4.0° (± 0.5°) / second 120°: 90° vertical to 15° Trendelenburg
	Precision 500D 90/90	0° to 4.0° (± 0.5°) / second 180°: 90° vertical to 90° Trendelenburg
	Precision 500D 90/45	0° to 4.0° (± 0.5°) / second 180°: 90° vertical to 45° Trendelenburg
Table Loading	Maximum Rated Patient Load	300 pounds (136.08 kg)

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Operating Temperature		50 to 100F (+10° to +38°C)
Relative Humidity		20% to 70% (non–condensing)
Altitude		8000 ft. (2438 m) above sea level max.
Storage or Shipping	Temperature	–40° to 140°F (–40°C to 60°C)
	Relative Humidity	20% to 80% (non–condensing)

3-1-1 Precision 500D Table Electrical Requirements

Electrical Data: Precision 500D Table with Intelligent Digital Device

Ratings: 240VAC, 20 amps, Single phase, 50/60 Hz

Power Supply Requirements:
Generator power unit provides 240VAC, single phase, 50/60 Hz*, 20 amp branch circuit plus ground

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3-2Precision 500D Tables, Tubes and Collimators

3-2-1 X–Ray Tube Specification

The following X-Ray Tubes may be used with Intelligent Digital Device and Precision 500D Table (Compatible with fluoro collimator). Refer to Appendix A, Maxiray 100 Tube Units, for further information about these X–Ray Tubes.

TABLE 7-10
X–RAY TUBE COMPATIBILITIES FOR IDD/PRECISION 500D TABLE

X–RAY TUBE	TARGET ANGLE	FOCAL SPOT	POWER	SHIM	TYPICAL APPLICATIONS
MX 100 FL	12.5°	0.6 mm/1.25 mm	32/100 KW	2.1°	DF TEMPORAL

TABLE 7-11
LEAKAGE TECHNIQUE FACTORS

TUBE UNIT	LEAKAGE TECHNIC FACTORS	
	kVp	mA
MX 100–FL 0.6–1.25 12.5° 46–155500G18 (Housing) 46–155318G36 (Insert)	150	5

TABLE 7-12
MINIMUM INHERENT FILTRATION

COMPONENT	MINIMUM INHERENT FILTRATION
TUBE UNIT	
MX 100–FL 0.6–1.25 12.5° 46–155500G18 (Housing) 46–155318G33 (Insert)	Equivalent to 1.1 mm aluminum at 150 kVp
COLLIMATORS	
• RAD Overhead AL01C	1.9 mm Al / 70kV
• Fluoro Undertable AF01A	1.5 mm Al / 70kV

NOTE: Radiopacity of the top and sub-panel is less than 1 mm aluminum equivalent at 100 kVp

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SECTION 4
OPERATION

4-1Parking (Docking) the Imaging Device Carriage

NOTE: Do not hold onto the power–assist handle during power–up.

If power–up tests fail, repeat the power–up test sequence by pressing the red **RESET** button located on the RCIM. If a failure occurs again, call GE service.

1. Verify the emergency **STOP** button on the table is disengaged.
2. Press the **POWER ON** button located on RCIM. Power up tests begin.
3. Apply the **Lat Long Lock**.
4. Disengage the compression lock (**Comp Lock**).
5. Move the imaging device vertically to maximum height over the table top.

NOTE: To aid parking, the system disables power assist near maximum vertical height. Use the grasp handle, (ILLUSTRATION 7-18), to assist positioning the imaging device.

6. Push down the CARRIAGE LOCK LEVER, (ILLUSTRATION 7-18), and simultaneously push the imaging device carriage to the rear. Refer to ILLUSTRATION 7-18.
7. At the rear, the CARRIAGE LOCK LEVER will engage in the PARK position.
8. For additional clearance, release the **Lat Long Lock** and push the imaging device and table tower assembly further to the rear.

If the carriage is not locked forward, X–ray exposures are inhibited.

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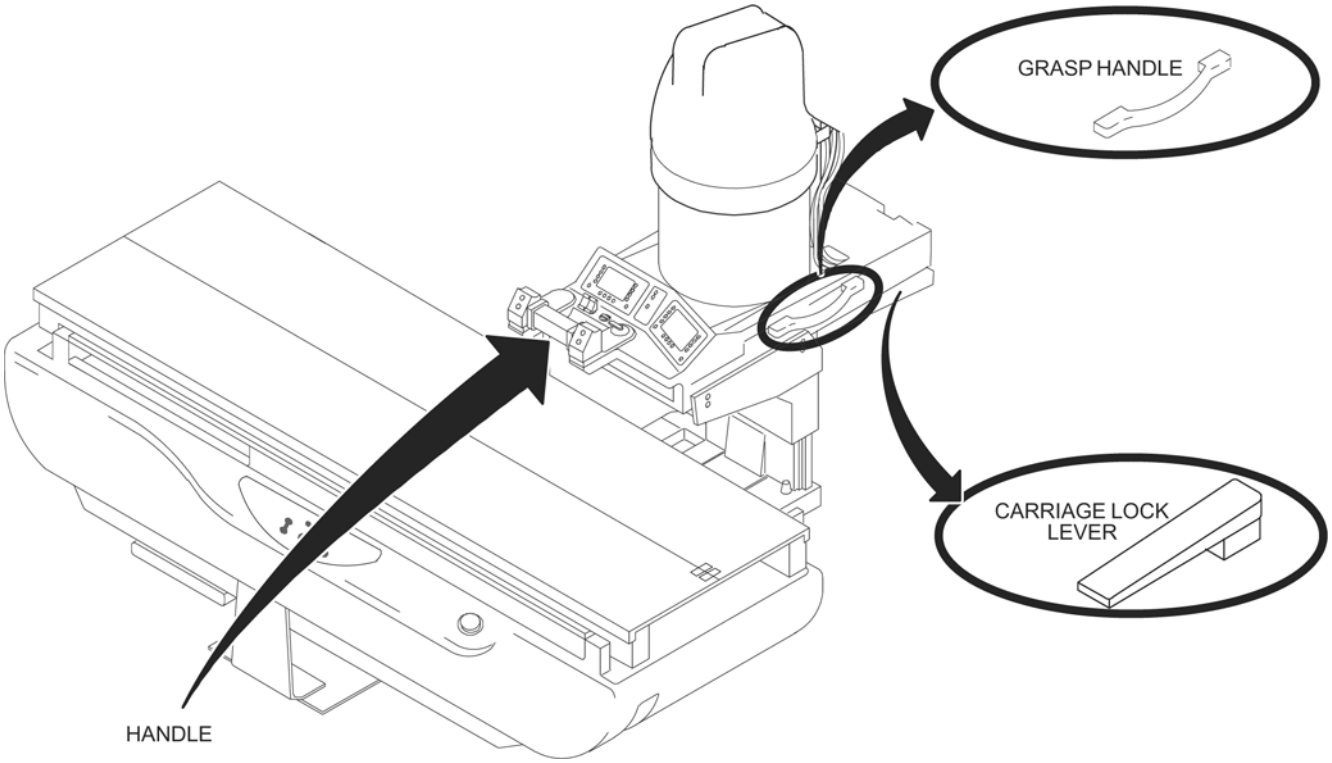
ILLUSTRATION 7-18
IMAGING DEVICE CARRIAGE



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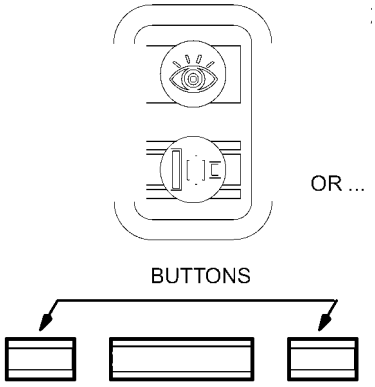
4-2Fluoro Exposures

After selecting protocol:

1. Set collimator blades manually to desired opening.

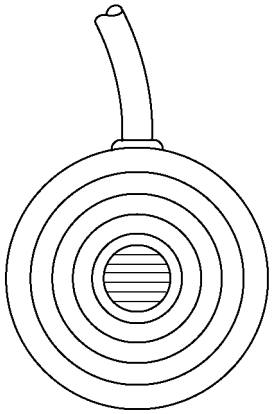
2. Press any of the four fluoro buttons, or the footswitch to initiate exposure.



4-2-1 Footswitch

The footswitch pedal is a single position footswitch. See ILLUSTRATION 7-19.

ILLUSTRATION 7-19
FOOTSWITCH BUTTONS



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4-3Taking Digital Exposures

4-3-1 Using the Prep/Record Bar

1. Press the PREP/RECORD bar to the first position.
2. Press the PREP/RECORD bar to the second position to expose.
3. Release the PREP/RECORD bar to terminate the exposure. Press the PREP/RECORD bar to the second position again to expose.

NOTE:

- If the PREP/RECORD bar is released to the first position during an exposure, the exposure will terminate normally.

4-3-2 Using the Integrated Fluoro/Expose Switch

For rapid fluoroscopic and digital record exposures, use the Integrated Fluoro and Expose Switch.

- For fluoro exposures – Depress the upper FLUORO switch.
- For radiographic exposures – Depress the lower PREP/EXPOSE switch.

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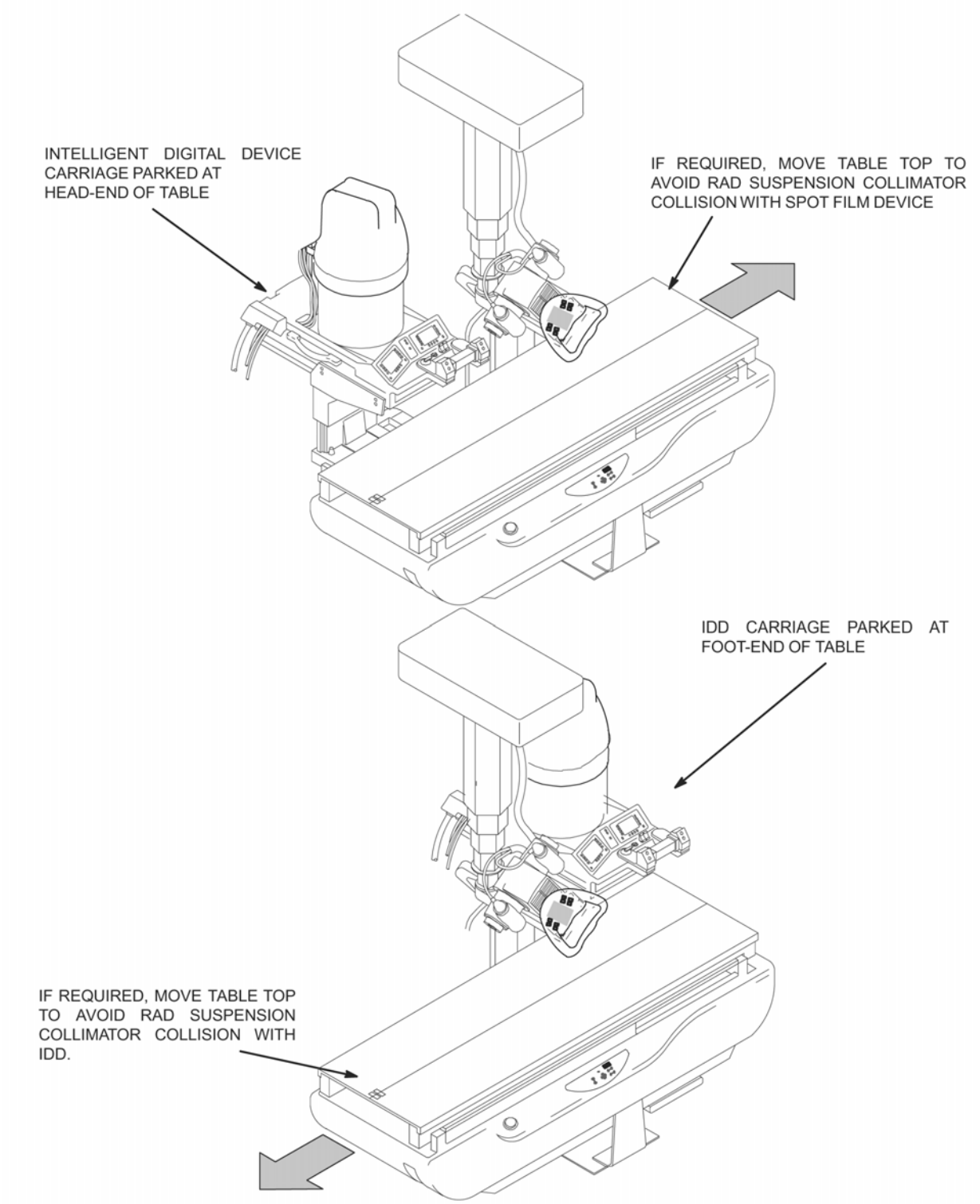
ILLUSTRATION 7-20
EQUIPMENT POSITIONING FOR TABLE BUCKY PROCEDURES


INTELLIGENT DIGITAL DEVICE CARRIAGE PARKED AT HEAD-END OF TABLE
IF REQUIRED, MOVE TABLE TOP TO AVOID RAD SUSPENSION COLLIMATOR COLLISION WITH SPOT FILM DEVICE
IDD CARRIAGE PARKED AT FOOT-END OF TABLE
IF REQUIRED, MOVE TABLE TOP TO AVOID RAD SUSPENSION COLLIMATOR COLLISION WITH IDD.

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4-4Equipment Positioning for Table Bucky Procedures

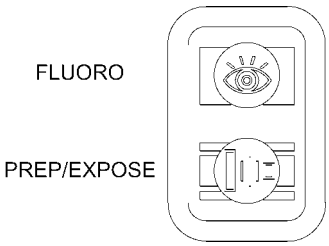
NOTICE

AVOID EQUIPMENT DAMAGE!

Damage to the Imaging Device Carriage will occur if the RAD Suspension is moved directly in front of the Imaging Device. Avoid a collision between the RAD Suspension collimator and the Imaging Device Carriage by making sure that the Imaging Device is parked fully at the head-end or foot-end of the table before moving the RAD Suspension into position. See ILLUSTRATION 7-20.

4-4-1 Table Horizontal

See ILLUSTRATION 7-20.



1. Load cassette into table bucky cassette tray.
2. Park Imaging Device Carriage at either the far head-end or far foot-end of the table.
3. Place patient on the table for required examination.
4. Carefully move RAD Suspension X–Ray Tube to place X–Ray beam over patient Region of Interest (ROI).

   When, locking tube in lateral detente position, a green light will come on at top of OTS.

   a. Turn on collimator field light.

   b. System will detente at 100 cm SID.

NOTE: If required, move the table top longitudinally (toward head-end or foot-end) to avoid a collision between the RAD Suspension collimator and the Imaging Device Carriage.

5. Align table bucky cassette tray to X–Ray beam.

   a. Slide bucky cassette tray out from table.

   b. Turn on collimator field light.

   c. Move bucky longitudinally to align bucky tray handle alignment notch with field light alignment beam.

   d. Insert bucky cassette tray into table.

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NOTICE

AVOID EQUIPMENT DAMAGE!

Damage to the 40 cm (16 inch) Image Intensifier will occur if the RAD Suspension is moved closer than a 48 inch (120 cm) SID when the table is angulated vertical or Trendelenburg. Avoid a collision between the RAD Suspension columns and the 40 cm (16 inch) Image Intensifier by maintaining a minimum SID of 48 inches (120 cm) for all table bucky procedures when the table is angulated.

CAUTION

To avoid Patient injury, patient must be strapped in before angulating table vertically or Trendelenburg.

1. Park Imaging Device Carriage at either:
   - The far foot-end of the table for table vertical procedures.
   - The far head-end of the table for table Trendelenburg procedures.
2. Place patient on the table for required examination.
3. Angulate table to desired position.
4. Carefully move RAD Suspension X–Ray Tube to position X–Ray beam over patient Region of Interest (ROI) at desired SID. If required:
   a. Turn on collimator field light.
   b. Move RAD Suspension over patient Region of Interest (ROI) with field light cross-hairs beam.

NOTE: **40 cm (16 Inch) systems limitation:** For systems equipped with 40 cm (16 inch) Image Intensifiers, the minimum, allowable SID is 48 inches (120 cm) when the table is angulated.

5. Align table bucky cassette tray to X–Ray beam.
   a. Slide bucky cassette tray out from table.
   b. Turn on collimator field light.
   c. Move bucky longitudinally to align bucky tray handle alignment notch with field light alignment beam.
   d. Lock bucky in place.
6. Load cassette into bucky cassette tray.
7. Insert bucky cassette tray into table.

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CHAPTER 8
OTS RADIOGRAPHIC SUSPENSION

SECTION 1
INTRODUCTION

1-1OTS (Overhead Tube Suspension)

The Overhead Tube Suspension (OTS) is the positioning device that supports the X–ray tube and OTS Console.

Each suspension provides convenient movement and accurate positioning of the equipment.

The X–ray Tube Overhead Suspension consists of four major elements

–The Overhead Stationary Rail System,

–The Telescopic Column and Carriage,

–Tube Support and User Interface (OTS Console).

–Multileaf Collimator.

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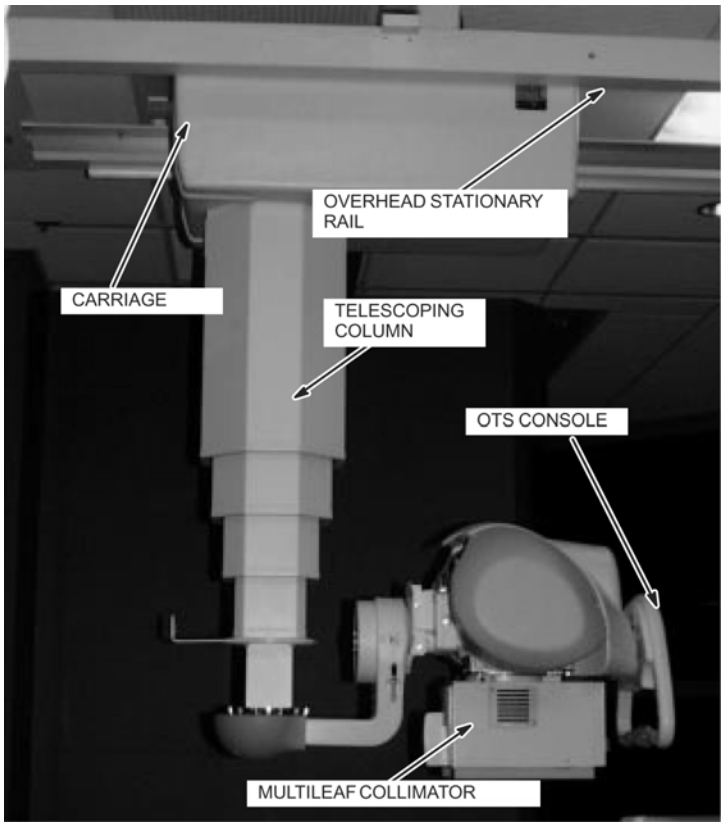
ILLUSTRATION 8-1
OTS COMPONENTS



1-2System Labeling

TABLE 8-1
SYSTEM IDENTIFICATION AND COMPLIANCE LABELS

DESIGNATION	OTS radiographic suspension	Automatic Collimator
MODEL NUMBER	2399849, B2055TR	AF01A

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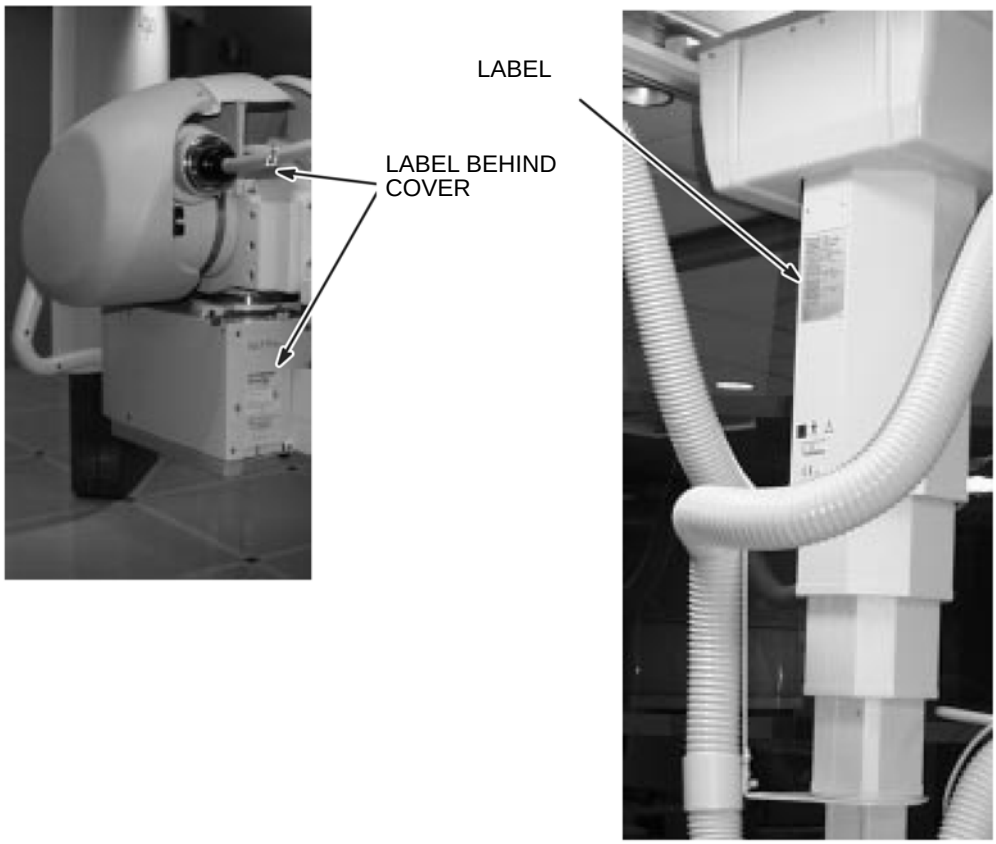
ILLUSTRATION 8-2
LOCATION OF SYSTEM IDENTIFICATION AND COMPLIANCE LABELS



1-3 Overhead Rail System

The overhead rail system consists of the stationary rails (ceiling mounted) and a bridge that travels longitudinally (LONG) along the rails. Guide bearings maintain alignment of the bridge with the rails and the X–ray table.

An electric lock controls motion of the bridge along the rails. A switch marked “LONG” on the user interface activates this longitudinal lock. Press down the switch will releases the lock. Releasing the switch reapplies the lock.

1-4Telescopic Column and Carriage

The carriage rides laterally (LAT) within the bridge. The lateral lock controls its motion. The switch marked LAT on the front of the user interface operates the lock. This switch functions in the same manner as the one for the longitudinal lock.

The telescopic column permits vertical (VERT) travel of the tube unit. The vertical lock controls its motion. The switch marked VERT on the user interface operates the lock. The switch must be held down while moving the tube unit.

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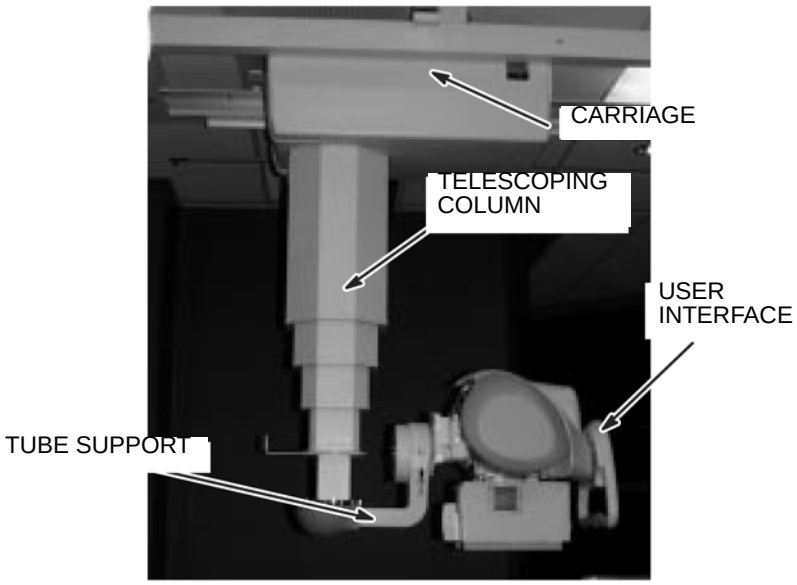
The vertical load is balanced by a spring counterpoise system within the carriage. The counterpoise system is equipped with a **safety** locking feature to prevent the tube unit from falling in the event of spring or main cable failure. Adding an accessory such as a collimator extension cylinder may cause the suspension to be slightly out of balance.

CAUTION

Collimator accessory weight may not exceed 4.5 kg (10 pounds). Use special care when using such an accessory since the tube unit will tend to descend when the vertical lock is released.

ILLUSTRATION 8-3
TELESCOPIC COLUMN AND CARRIAGE



1-5Use of Longitudinal and Transverse Detents

The suspension is programmed with Longitudinal and Lateral detents to automatically apply the locks and signal the collimator when the tube is positioned at specific SID's, for vertical table or wall stand procedures. For table, lateral detent is set at the table lateral center line. For wall stand, lateral detent is set at the wall stand panel lateral center line, and the longitudinal detent is set at SID 180cm(72 inches) and 100cm(40 inches). Selection is made at the time of installation and is usually with the focal spot over the longitudinal table and wall stand center line. The locks are actuated through electrical detents and the switch marked DETENT. Depress the "DETENT" switch and the "LAT" switch to index the focal spot over the longitudinal table center line. Depress and momentarily hold the "LONG" switch (with the "DETENT" switch still depressed) to index the focal spot at one of the pre–selected SID's. When reaching the approximate position, motion should be slow to avoid passing over the detent bracket. To move out of the indexed positions, depress the "DETENT" switch a second time.

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1-6Tube Support Rotation

The tube unit can be pivoted about the vertical axis of the telescopic column (tube support rotation) 180° in each direction from the table “NORMAL” position. It automatically locks in each 30° position. To release it, depress the tube support rotation lock lever on the right side of the tube support. Then pivot the tube unit and release the lever. The tube support will lock in the next 30° position.

ILLUSTRATION 8-4
TUBE SUPPORT ROTATION DETENT RELEASE LEVER

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1-7X–ray Tube Angulation

The other rotational feature of the tube support permits TUBE ANGULATION about the short axis (front to back). The amount of angulation is indicated on the user interface. Limits of angulation are 180° in either direction from the X–ray beam down position. The angulation lock that is controlled by the switch marked ANG maintains angular positions. while angulating the tube.

Angular positions will detent every 90° automatically starting with the X–ray beam down position. To move out of a detent position, depress the ANG button and hold this switch down, rotating the tube assembly. Release the button to lock the tube in place.

NOTE: Angulation lock is the Electro Magnetic, spring applied, type. They remain “on” when the system power is off. They can be released only when the power is on and their respective switches are depressed. In emergencies, the tube unit can be moved against the force of the locks.

ILLUSTRATION 8-5
X–RAY TUBE ANGULATION

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1-8Over Head Ceiling Suspension User Interface

The in–room user interface allows the operator to make receptor type, kV and mAs selections without returning to the System Console. Positioning of the X–ray tube can be performed with one or two–hands. The locks and lock releases on the user interface make positioning the X–ray tube easy.

NOTE: Changing exposure parameters or receptors on either system console or OTS console will result in a same change to both consoles.

ILLUSTRATION 8-6
OTS CONSOLE

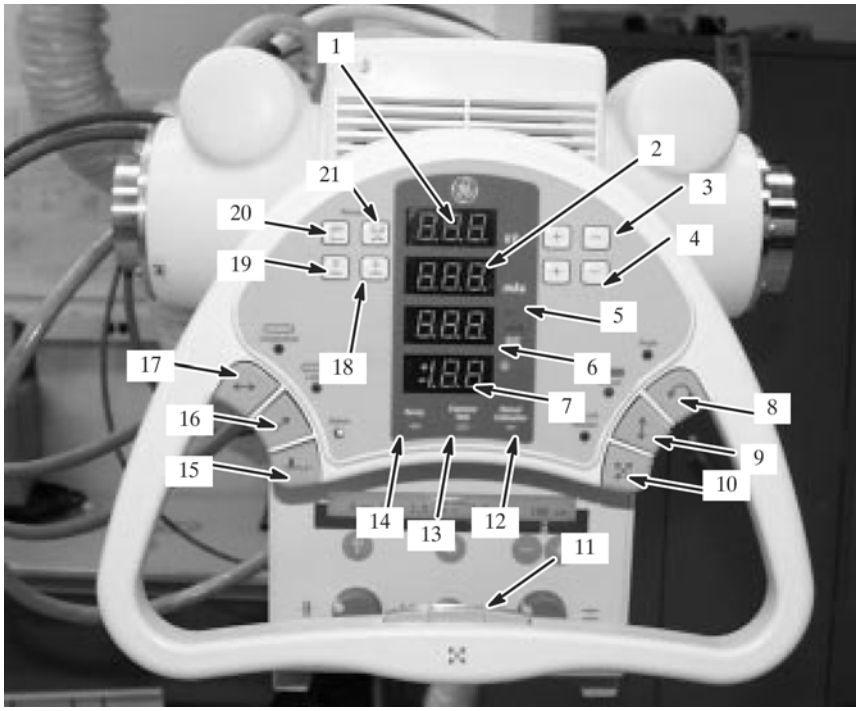

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TABLE 8-2
OTS OPERATOR CONTROLS AND INDICATORS

Item	Title	Type	Description
1	kV Display	Indicator	Display exposure kV.
2	mAs Display	Indicator	Display exposure mAs.
3	kV Increment and Decrement Keys	Control	Increase or Decrease exposure kV.
4	mAs Increment and Decrement Keys	Control	Increase or Decrease exposure mAs.
5	Unit Display	Indicator	Display SID scale.
6	SID Display	Indicator	Display SID scale.
7	Angulation Display	Indicator	Display tube rotation angle.
8	Tube Angulation Lock Release	Control	Releases magnetic lock to allow tube angulation.
9	Vertical Lock Release	Control	Releases magnetic lock to allow vertical tube motion.
10	All Lock Release	Control	Releases all OCS magnetic locks to allow vertical, transverse, longitudinal, and tube angulation motions. Note: If in lateral or vertical detent the lateral or vertical lock will not be released. The DETENT button MUST be released. ÁÁÁ
11	All Lock Release	Control	Releases all OCS magnetic locks to allow vertical, transverse, longitudinal, and tube angulation motions. Normally open momentary type button, without indicator. Note: If in lateral or vertical detent the lateral or vertical lock will not be released. The DETENT button MUST be released. ÁÁÁ
12	MANU. COLI	Indicator	Indicates that the collimator is working in manual mode
13	Exposure Hold	Exposure	Indicates for some reason an exposure is not permitted. ÁÁÁ
14	READY	Exposure	This button is lit when the system is ready for exposure.
15	DETENT	Control	Lock or Release the Detent magnetic lock. Normally open self–lock type button.
16	Lateral Lock Release	Control	Release magnetic lock to allow lateral motion. Normally closed self–lock type button, with green indicator.
17	Longitudinal Lock Release	Control	Release magnetic lock to allow longitudinal motion. Normally closed self–lock type button, with green indicator. ÁÁÁ
18	Table Top	Receptor	Selects the Table Top as the image receptor
19	TABLE	Receptor	Selects the table bucky/cassette tray as the image receptor ÁÁÁ
20	WALL	Receptor	Selects the Wall Stand Film Cabinet as the image receptor.
21	Function Not available at this time		
22	Collimator Select	Control	Select the operating mode of the auto collimator (Behind the console)

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1-8-1 Key Switch on OTS Console

The Key Switch is located on the back of the OTS User Interface. The Key Switch is intended for use when a system failure has occurred.

The OVERRIDE position disables the exposure hold interlocks and allows exposure.

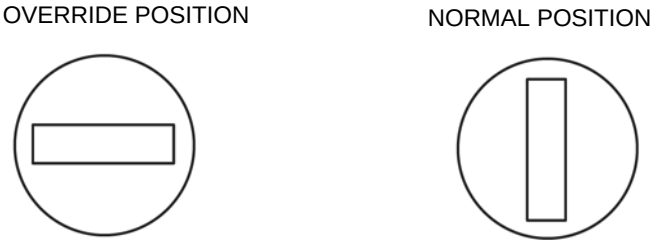
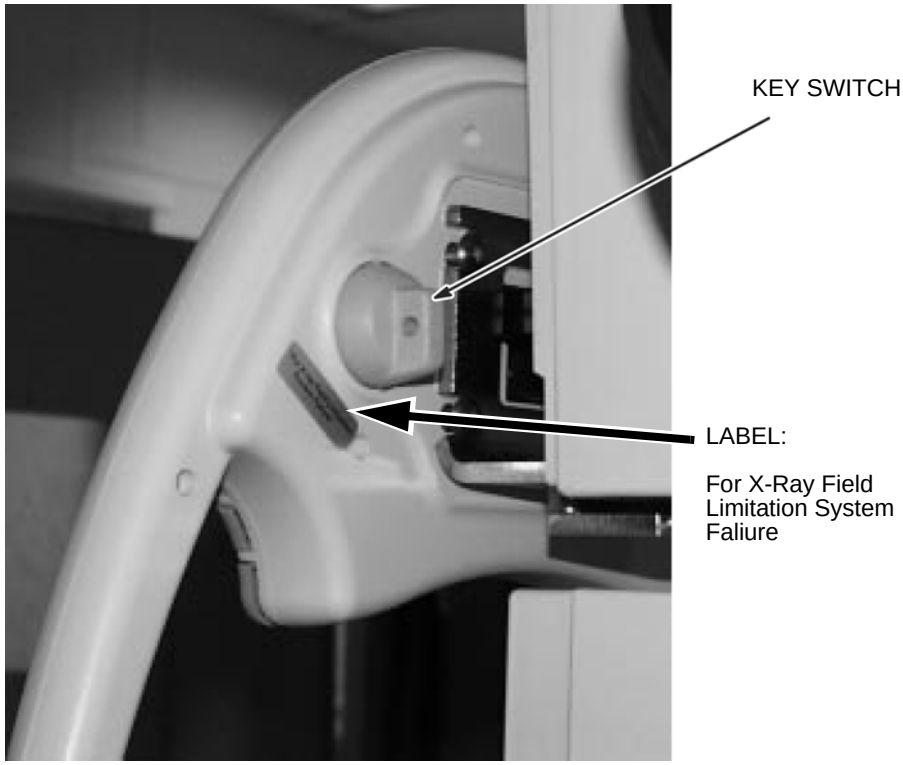


ILLUSTRATION 8-7
OTS CONSOLE KEY SWITCH



SECTION 2
AUTOMATIC COLLIMATOR

Operational Controls on the Collimator

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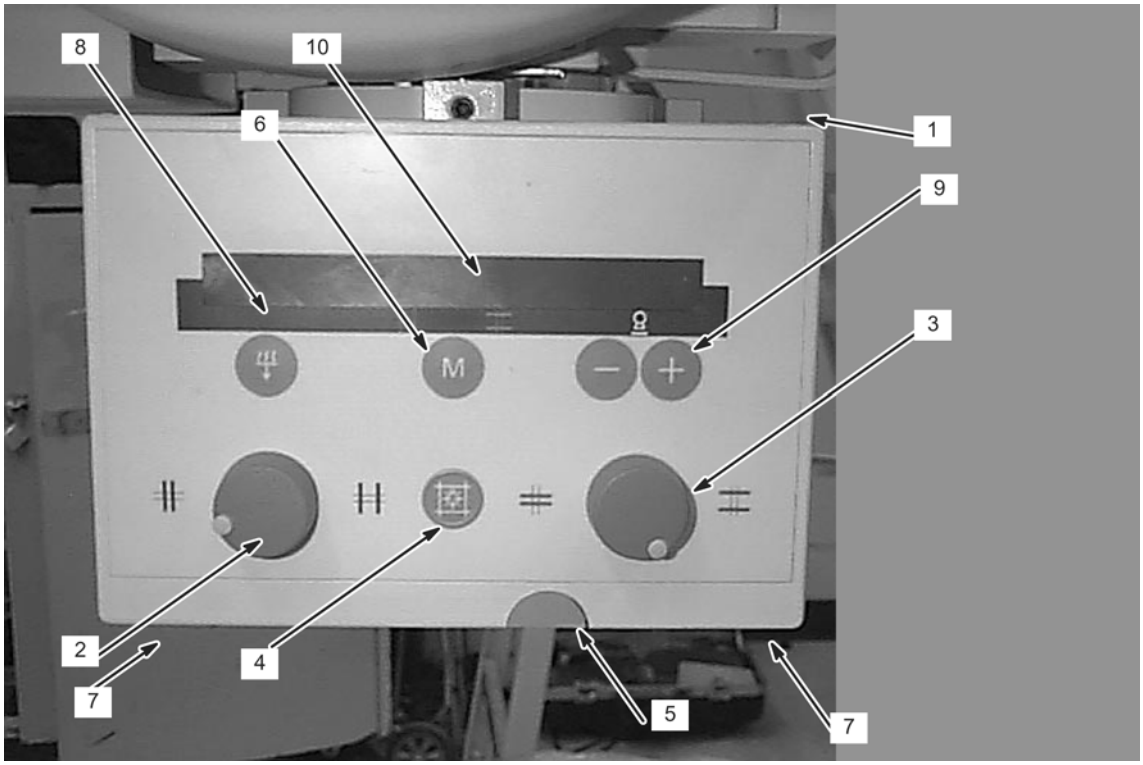
ILLUSTRATION 8-8
AUTOMATIC COLLIMATOR CONTROLS



(1) Locking lever for 90° rotation of the collimator about vertical axis
The collimator stops only in 0° position.

(2) Adjusting knob for format height collimation
(Turning to the left closes the collimator, turning to the right opens the collimator)

(3) Adjusting knob for format width collimation
(Turning to the left closes the collimator, turning to the right opens the collimator)

(4) X–ray field illumination and linear light localizer on/off
Cutout also performed automatically via a time switch.
The automatic light timer can be configured in 1 second increments up to the maximum of 90 seconds which is the default.

(5) Measuring tape grip for SID measurement
– Take reading at bottom edge of multileaf collimator.
– The measuring tape has both a cm and an inch graduation

(6) MEMORY Button for resetting the collimator to the FOV utilized in the last exposure. If there is an Exposure Hold active all issues must be rectified and a ready light present before the Memory becomes active. If exposure hold is active it will display the interlock that is active.

(7) Two accessory rails

(8) Function display (see following page)

(9) SID Scale Selection (manual mode)

(10) Cu Filter Selection

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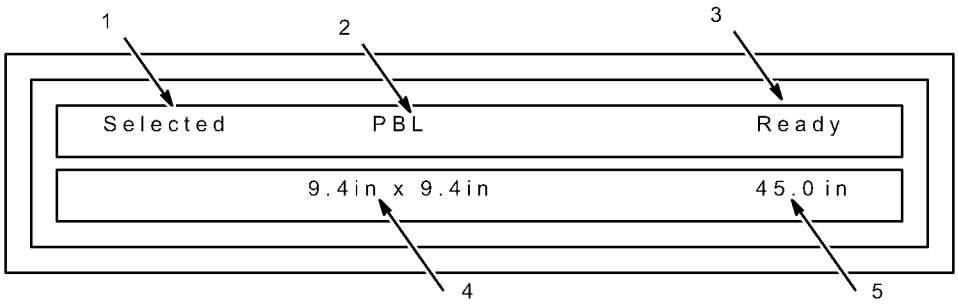
2-1 Locking lever

The locking lever locks the compensating filters, templates, etc. inserted in the accessory rails of the multileaf collimator in place to prevent them from falling out

To remove an accessory from the collimator, the locking lever must be pressed in until the compensating filter, templates etc., can be removed.

2-2Display on the Collimator

ILLUSTRATION 8-9
AUTOMATIC COLLIMATOR DISPLAY



Selected = Bucky workstation on Bucky Table or Bucky Wall Stand selected
(1) Selected = x–ray tube unit selected
(2) Operating mode:
PBL = with automatic format collimation system
Manual = Without automatic format collimation system
(3) Ready = ready for operation
(4) Display of width and height of collimated x–ray field
(5) Display of film–focus distance (SID)

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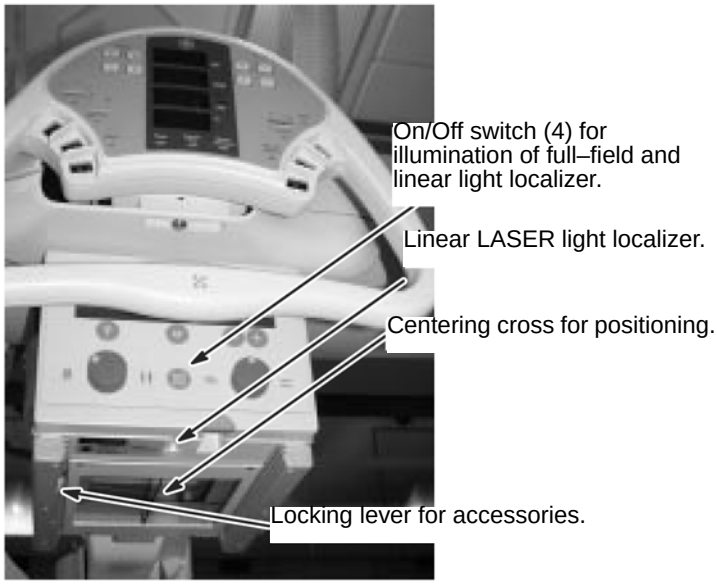
2-3Bottom View of the Collimator

ILLUSTRATION 8-10
AUTOMATIC COLLIMATOR BOTTOM VIEW


On/Off switch (4) for illumination of full–field and linear light localizer.
Linear LASER light localizer.
Centering cross for positioning.
Locking lever for accessories.

2-4Linear LASER Light Localizer

The linear LASER light localizer provides the axis mark for longitudinal centering which is lined up with the centering mark on the handle of the cassette loading device.

The linear LASER light localizer for projection of the centering cross is switched on and off with push button (4) on the control panel.
– Automatic cutout of this function is effected via an internal time switch.

LASER RADIATION
PEAK POWER 1MW/WAVE LENGTH 540–700 NM/CLASS II LASER PRODUCT
DO NOT STARE INTO BEAM!
WHEN YOU SWITCH ON THE LINEAR LASER LIGHT LOCALIZER, TAKE CARE THAT NO PERSON LOOKS DIRECTLY INTO THE LASER TO AVOID EYE INJURIES OR IMPAIRED VISION.

2-5Centering Cross

The centering cross is used to display the longitudinal and transverse axies of the exposure field on the cassette or directly on the patient.

The full–field light localizer for projecting the centering cross is switched on and off with push button (4) on the control panel.
– Automatic cutout is performed via an internal time switch.

The linear and full–field light localizers can not be switched separately.

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2-6Rear View of Collimator

(1) Locking lever for 90° rotation of collimator around vertical axis

ILLUSTRATION 8-11
AUTOMATIC COLLIMATOR REAR VIEW

2-7Collimator Lamp Changing

2-7-1 Changing Lamps on the Collimator (Model 2266999)

The bulb of the collimator may be changed if necessary.

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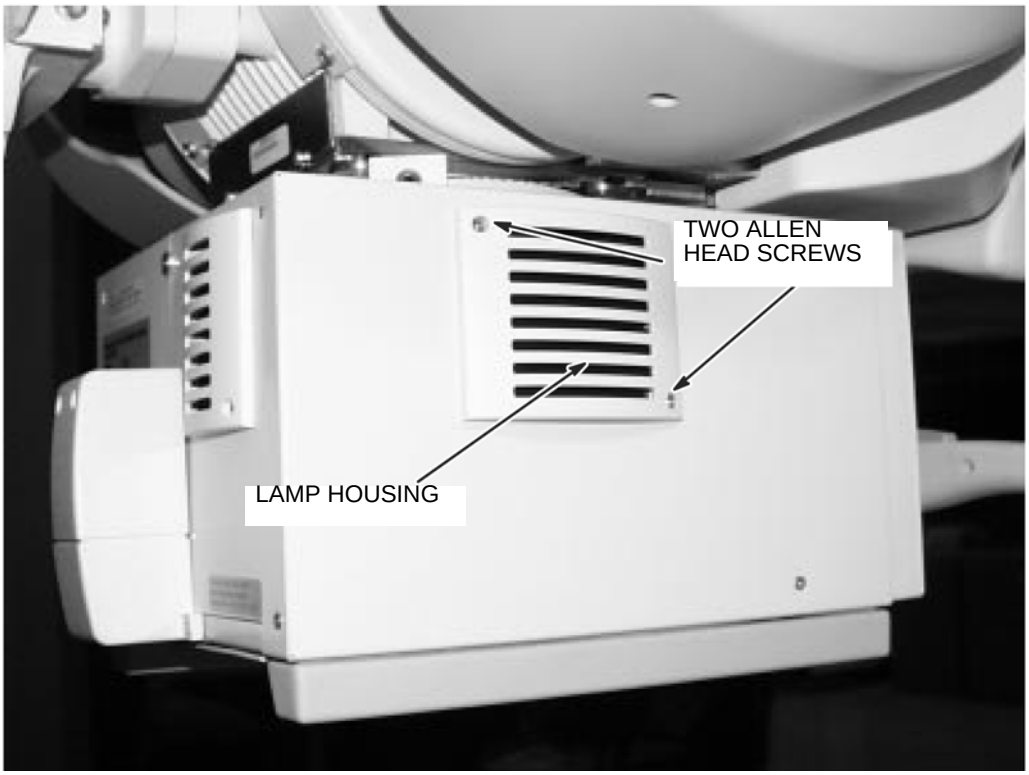
ILLUSTRATION 8-12
AUTOMATIC COLLIMATOR LAMP LOCATION



Switch off the system.
Remove two Allen head screws on lamp housing.
Remove lamp housing.
Remove the two Allen contact screws on the lamp.
Replace the halogen bulb.
Do not touch new lamp with your bare fingers.
Screw the two Allen contact screws tight.
Mount lamp housing and fasten it by re–tightening both screws.

WARNING

IF THE HALOGEN LAMP OF THE LIGHT LOCALIZER REMAINS ILLUMINATED FOR A LONGER PERIOD OF TIME, THE HOUSING MAY HEAT UP. PLEASE AVOID TOUCHING THE LAMP HOUSING TO PREVENT BURNS.

WARNING

ALWAYS USE OEM REPLACEMENT LAMPS FOR THE LIGHT LOCALIZER. HALOGEN LAMPS, WHICH ARE NOT SHORT–CIRCUIT–PROOF, MAY BREAK AND RESULT IN INJURIES CAUSED BY BROKEN GLASS. LAMP TYPE DESCRIPTION: LOOK AT THE LABEL AT THE BACKSIDE OF THE COLLIMATOR.

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2-7-2 Changing Lamps on the Collimator (Model 5234954)

)The Automatic Collimator uses a special collimator light bulb and it MUST be replaced with part number 2271727. Other lamps may not meet HHS requirements.

The X-ray field to light field is aligned in the factory. This collimator bulb requires no alignment for X-ray to light field, since the filament is in the same place in all bulbs. There is no field adjustment for X-ray field to Light field alignment if another type of bulb is used.

THE HOUSING CAN BE HEATED IF THE LIGHT LOCALIZER IS SWITCHED ON FOR LONGER PERIODS OF TIME.
PLEASE DO NOT TOUCH THE LAMP HOUSING UNTIL IT HAS BEEN COOLED DOWN IN ORDER TO PREVENT BURNING!

ONLY USE ORIGINAL SIEMENS SPARE PARTS!
THE BULB TYPE DESCRIPTION IS PRINTED ON A LABEL ON THE BACK OF THE COLLIMATOR.
HALOGEN BULBS THAT ARE NOT SHORT-CIRCUIT PROOF COULD BURST AND THE RESULTING GLASS SPLINTERS COULD CAUSE INJURIES!

1. Switch the system off.
2. Loosen the lamp cover fastening screws.
3. Remove the lamp cover (ILLUSTRATION 8-13).
4. Loosen (single turn) the two heat shield screws.
5. Remove the heat shield (ILLUSTRATION 8-14).
6. Remove the defective bulb.
7. Insert the new bulb and make sure both contacts are touching the frame stop position (ILLUSTRATION 8-15). Do not touch the bulb with your bare fingers.
8. Insert the heat shield to the stop position and tighten the screws.
9. Attach the lamp cover.

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ILLUSTRATION 8-13
LAMP COVER

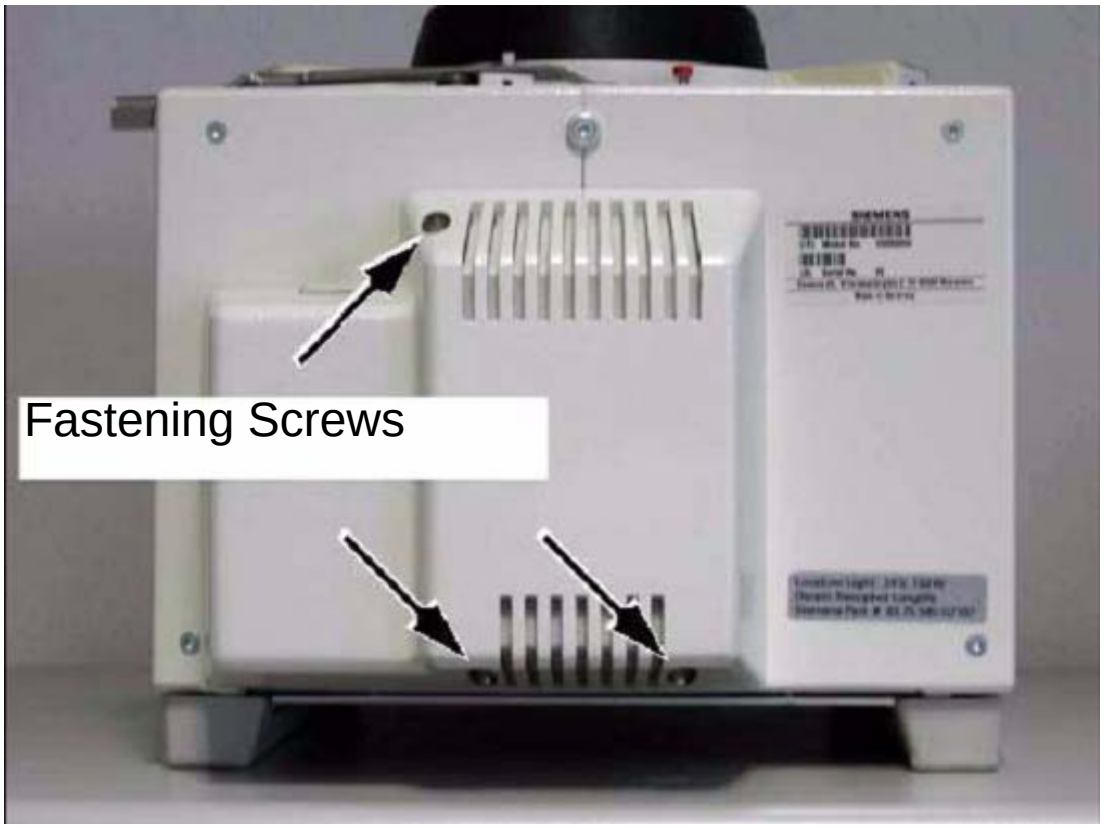

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ILLUSTRATION 8-14
LIGHT LOCALIZER HEAT SHEILD

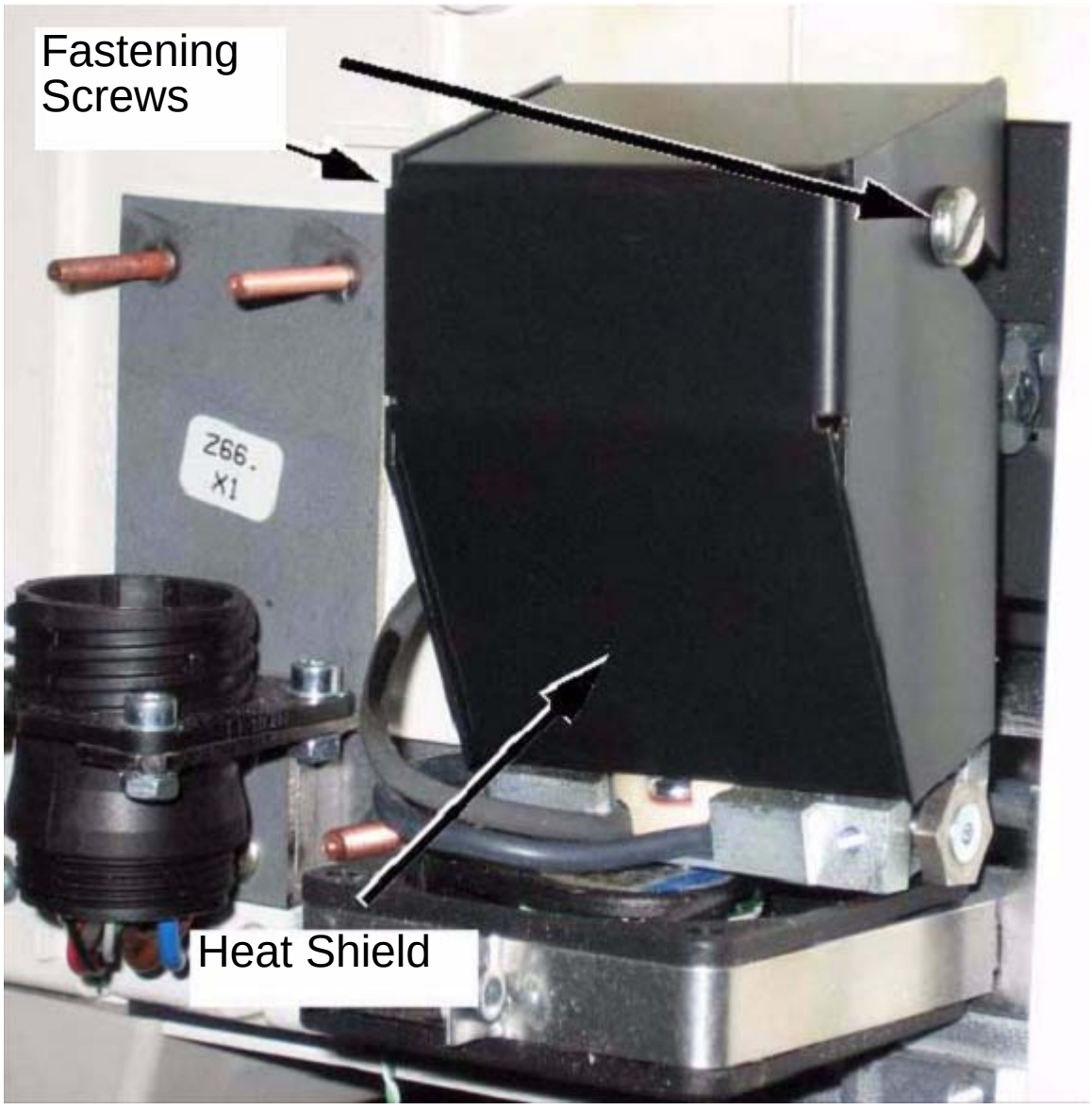

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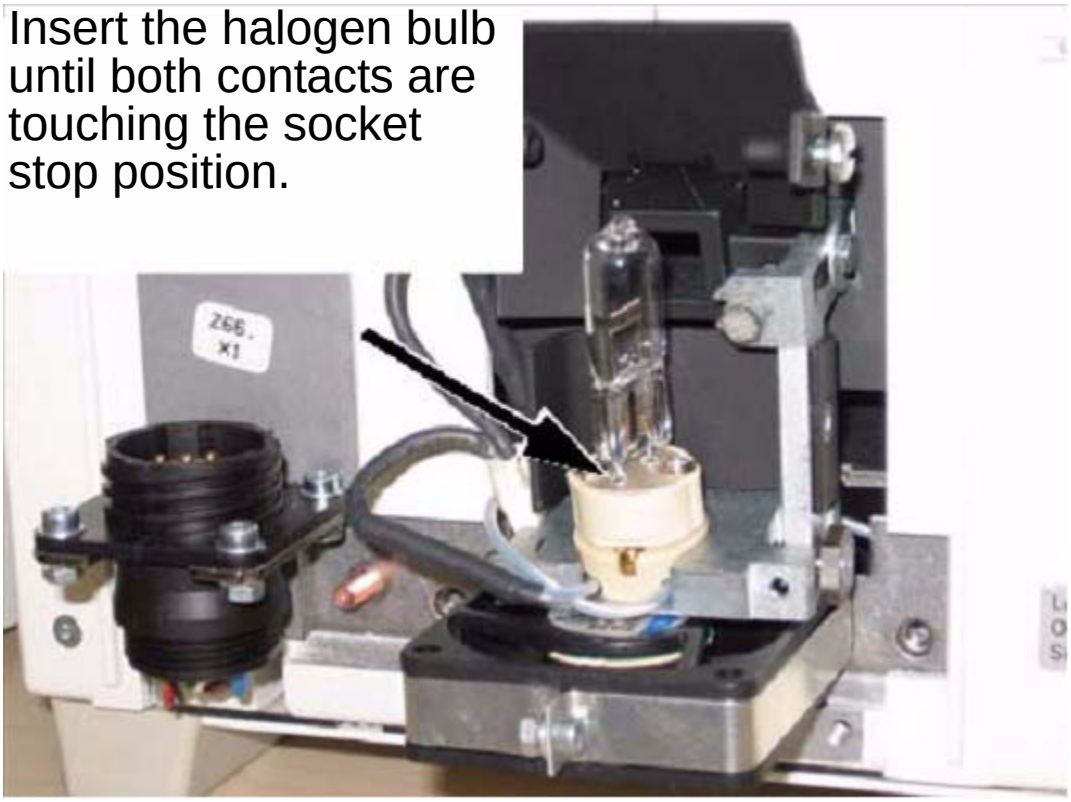
ILLUSTRATION 8-15
HALOGEN LAMP



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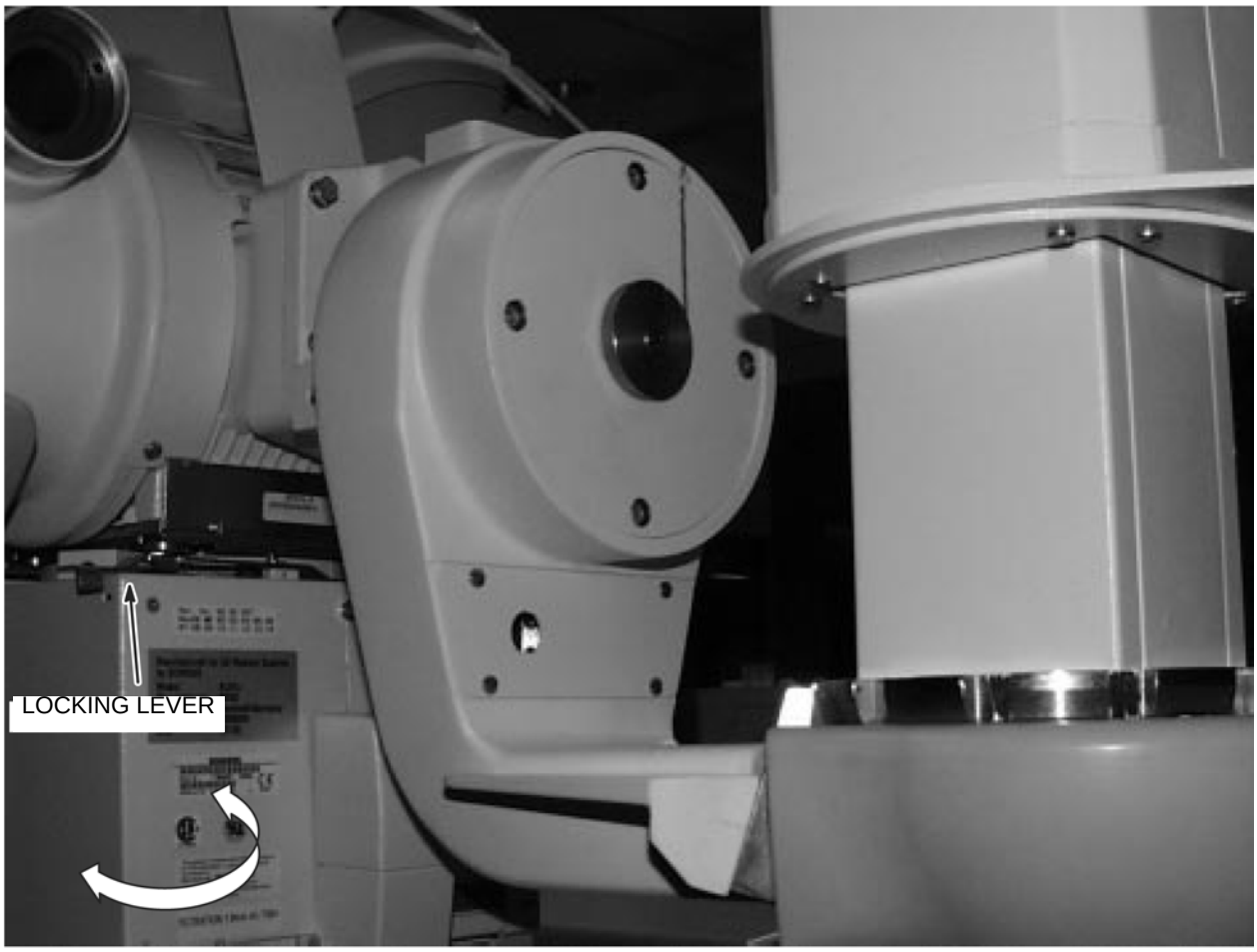
2-8Rotating the Collimator 90° Around the Vertical Axis

Move locking lever on multileaf collimator toward front panel, i.e. toward the operator.

ILLUSTRATION 8-16
AUTOMATIC COLLIMATOR ROTATION LOCKING LEVER



Multileaf collimator in 0° lock–in position

– The 0° lock–in position of the multileaf collimator is released by actuating the locking lever. The maximum rotation of the collimator up to the CW or CCW stop is +/– 45 degrees.

Grasp collimator with both hands and turn it to the 0° lock–in position

WARNING

ALWAYS GRASP MULTILEAF COLLIMATOR IN SUCH A WAY THAT NEITHER HAND CAN BE PINCHED OR CRUSHED BETWEEN THE HANDLES AND THE COLLIMATOR.

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SECTION 3
SPECIFICATIONS

NOTE: Because X–ray equipment produces radiation, special precautions may need to be taken or special site modifications may be required. The General Electric Company does not make recommendations regarding radiation protection. It is the purchaser's responsibility to consult a radiation physicist for advise on radiation protection in X–ray rooms.

NOTE: There is an Overheat Interlock on the X–ray Tube Housing. If the factory–adjusted temperature of the tube housing goes higher than the permissible level, x–ray emission is terminated. If this occurs, call for service.

TABLE 8-3
RELATIVE HUMIDITY AND TEMPERATURE

PRODUCT OR COMPONENT	RELATIVE HUMIDITY				TEMPERATURE			
	IN–USE		STORAGE		IN–USE		STORAGE	
	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.
OTS	10%	80%	5%	95%	+10C (50F)	40C (104F)	–40C (–40F)	+70C (158F)
X–ray Tube	10%	80%	5%	95%	+10C (50F)	40C (104F)	–40C (–40F)	+70C (158F)

TABLE 8-4
ALTITUDE AND ATMOSPHERIC PRESSURE

PRODUCT OR COMPONENT	ALTITUDE				ATMOSPHERIC PRESSURE			
	IN–USE		STORAGE		IN–USE		STORAGE	
	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.
OTS	–400 m (–1312 ft.)	**3000 m (9842 ft.)**	–400 m (–1312 ft.)	**15000 m (49212 ft.)**	10.17 psi (70.1 kPa)	**15.4 psi (106 kPa)**	1.75 psi (12.1 kPa)	**15.4 psi (106 kPa)**
X–ray Tube	–400 m (–1312 ft.)	**3000 m (9842 ft.)**	–400 m (–1312 ft.)	**15000 m (49212 ft.)**	10.17 psi (70.1 kPa)	**15.4 psi (106 kPa)**	1.75 psi (12.1 kPa)	**15.4 psi (106 kPa)**

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TABLE 8-5
OTS SPECIFICATIONS

Parameter	Specification	
Longitudinal Focal Spot Travel	2757 mm (108–1/2 in.)	
Lateral Focal Spot Travel	1200 mm (47–1/4 in.)	
Vertical Focal Spot Travel	1500 mm (59 in.)	
Horizontal Tube Rotation	+/– 180 degrees; detents at each 90 degree position	
Vertical Tube Rotation	+ 110/–20 degrees	
Focal Spot to Ceiling Distance (Horizontal)	Min 733mm (28–7/8 in.)	Max 2232mm (87–7/8 in.)
Focal Spot to Ceiling Distance (Vertical)	Min 713mm (28–1/16 in.)	Max 2211mm (87–1/16 in.)
Distance between Center Lines of Ceiling Mounting Bolt Holes in Stationary rails	1.43m(56”), or 1.27m(50”), or 1.22m(48”)	
Minimum Overall Room Dimension, Front to Back, without Modifying Basic Structure	3.2m (124–1/4”)	
OTS Suspension Weight	431kg (50lbs)	
OTS Console		
kV Control and Display	40–150	
mAs Control and Display	0.5–630	
SID Display	0–200	
Tube Angle Display	–180 to +180	
Power Supply		
OTS Console	+5VDC, 2.5A	
	+12VDC, A	
	– 12VDC, A	

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TABLE 8-6
AUTOMATIC COLLIMATOR SPECIFICATIONS

Parameter	Specification
Collimator	Digital version with automatic formats collimation system and light localizer for rectangular collimation with linear light localizer and rails for secondary filters
Operation Mode	Automatic Manual
Dimensions	349 L x 237W x 181 H (mm)
Weight	9.8 +/– 0.5 (kg)
Aperture Angle	28° / 28°
Angle of Rotation around central beam axis	+/– 45°
Maximum field Size with SID = 90cm	43cm x 43cm
Maximum field Size with SID = 100cm	3cm x 3cm
Power Supply: **DC Input Voltage (V)** **Max. DC Input Current (A)** **ACV Input Voltage (V)** **Mac AC Input Current**	 24 +/– 10% 1.5 28 ... 40 +/– 10% 10
Halogen Lamp	24V~/ 150W / Part Number: 8375545 G2107 Only OEM Siemens parts may be used as replacement parts!
Operation Temperatures	10°C ≤ to ≥ 40°C
Transport and Storage Temperatures	– 40°C to +70°C
Inherent Filtration	EN 60601–1–3 Standard 1.0 mm Al at 70 kV
Leakage Filtration	EN 60601–1–3 Standard < 0.5 mGy/h

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CHAPTER 9
SG–80 & SG120 VERTICAL BUCKY STAND

SECTION 1
INTRODUCTION

The SG80/120 is defined as a Vertical Bucky Stand suitable for providing common radiographic examinations, including chest films and oblique angle radiography. With the right choice of X-ray tube supports, tubes and generators, the SG80/120 is able to provide vertical and horizontal off-table radiography.

The tilting/rotating functionality is available only in SG120 model.

ILLUSTRATION 9-1
SG-80

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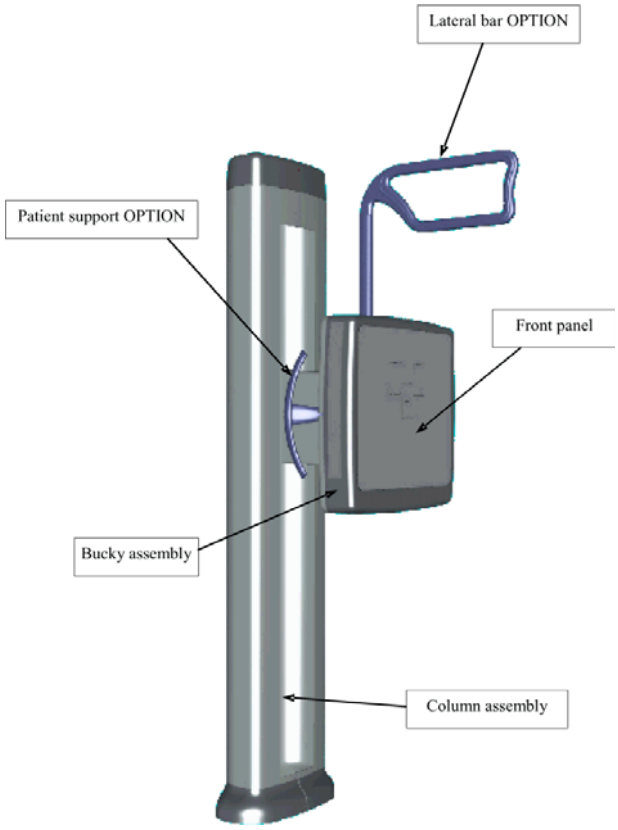
SECTION 2
PARTS OF THE EQUIPMENT

The main parts of the SG80/120 are detailed in ILLUSTRATION 9-2.

ILLUSTRATION 9-2



2-1 Column Assembly

The column assembly includes the next main parts:

- Bucky support assembly: joins the column assembly to the bucky assembly means of the vertical carriage that moves along the guide on the column. Includes the vertical lock handle to control the vertical movement of the bucky assembly.
- Covers: give the final appearance to the equipment.
- Counterweights: permit to counterbalance the bucky assembly to enable it can be moved smoothly along the vertical direction.
- Column Stand: it is the main part of the column assembly, It is fixed to the floor and is in charge to hold all the elements.
- Main cabling and electronic devices: in the column assembly are located the equipment cables and electronic boards.

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2-2 Bucky Assembly

Includes the bucky, that is mounted to the bucky support behind the front panel. Includes a cassette tray, suitable for all standard cassette sizes.

In the bucky assembly are also located other parts, such as the grid (optional) and the ion chamber, used for AEC exposures.

2-3 Front Panel

Includes a carbon fiber manufactured barrier of dimensions 562 x 510 x 3, with an absorption of maximum 0.9 mm Al measured at 100 KVp.

2-4 Vertical Lock Handle

The vertical lock handle enables to displace the bucky carriage holding the bucky assembly along the column stand. The vertical lock handle is left-right field configurable.

SECTION 3
APPLICATIONS OF SG80/120

The SG80/120 vertical Bucky stands are designed specifically to handle a full range of applications, from emergency procedures to routine radiographic studies. Their smooth vertical travel enables a wide range of examinations with the patient standing or sitting.

The SG120 offers even greater versatility with a tilting panel, controlled with electromagnetic brakes, for angulation examinations.

The next accessories are available for use with the SG80 and SG120:

- Patient Support Kit (Lateral Bar and Patient Grip) to provide user support during exposures.
- Manual Hanging Cassette Holder to allow table-top exposures on vertical bucky stand.
- SG80/120 vertical bucky stands comply with all standard medical regulations (UL, 21CFR, CSA, NRTL/C, CE, IEC).

SECTION 4
OPERATION

4-1Vertical Positioning

The SG80/120 remains locked in its vertical position when the equipment is switched ON thanks to the electromagnetic vertical brakes.

Procedure:

1. Press the key on the vertical lock handle.

2.Check that the brakes are released and the bucky assembly can be displaced smoothly along the vertical direction.

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3.Set the bucky assembly at the desired height, depending on the study to be performed.

4.Release the key on the vertical lock handle and check the bucky assembly remains locked in the desired position.

NOTE: The vertical lock handle is located on the LEFT side behind the bucky assembly, but this configuration can be easily field configured if needed. See Service Manual for details on LEFT to RIGHT configuration change.

Functionalities SG120:

- Min. height from floor:
  - Horizontal position: 63.5 cm (25 in)
  - Vertical position: 33 cm (13.1 in.) centre of the bucky
- Max. height from floor:
  - Horizontal position: 213 cm (83.9 in.)
  - Vertical position: 190.5 cm (75 in.) bucky centre

Functionalities SG80:

- Min. height from floor: 41 cm (16.1 in.) Bucky centre
- Max. height from floor: 190.5 cm (75 in.) Bucky centre

4-2 Cassette Loading

The SG80/120 is equipped with a cassette tray, suitable for all standard cassette sizes, that is manually inserted in the bucky assembly.

NOTE: The SG80/120 is LEFT configured for cassette loading but this configuration can be changed if needed. See Service Manual for details on LEFT to RIGHT configuration change.

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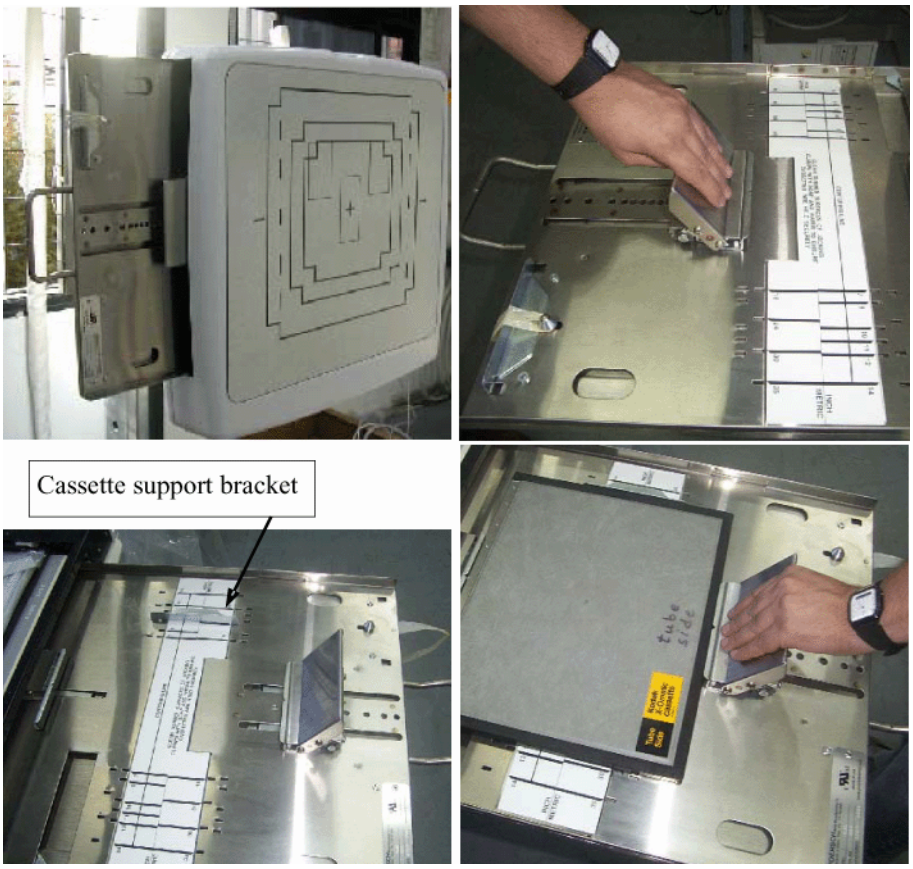
ILLUSTRATION 9-3
Cassette Loading



Procedure (See ILLUSTRATION 9-3)

1. Extract the cassette tray pulling by its handle.

2.Open cassette-clamp locking assembly. Spread out and separate the clamps.

3.Insert the cassette support bracket into the appropriate holes.

4.Insert the cassette between the cassette clamps, resting it on the cassette support bracket, Reposition the clamps against the cassette and close the cassette-clamp locking assembly.

5.Insert the cassette tray into the bucky tray slot.

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WARNING

TO AVOID THE CASSETTE-CLAMP LOCKING ASSEMBLY CAN BE DAMAGED, ALWAYS CLOSE IT BEFORE INSERTING THE CASSETTE TRAY INTO THE BUCKY TRAY SLOT

USE CAUTION TO AVOID CASSETTE SENSING ARM DEFORMATION. ITS SHAPE IS IMPORTANT TO OBTAIN ACCURATE FIELD PLACEMENT. IF THE ARM IS DAMAGED, IT HAS TO BE REPLACED. DO NOT TRY TO REPAIR THE ARM IN CASE IT BECOMES DEFORMED.

NOTE: Normally, it is not needed to remove completely the cassette tray from the bucky in order to load a cassette. Cassettes may be inserted in the tray by pulling the tray until movement is stopped by the catch on the lower rear of the tray.

NOTE: Even if it is not needed, if it is wanted to remove totally the cassette tray from the bucky, just pull the tray out until it is stopped by the catch (located on the upper or lower side of the tray depending if the SG80/120 is left or right tray insertion configured), then press the catch to the bottom of the tray and keep it pressed while you slide carefully the tray out of the bucky assembly.

4-3 Cassette Removal

Procedure:

1. Extract the cassette tray pulling by its handle.

2.Pull up the tightening lever and remove it from the cassette, that remains free.

3.Remove the cassette and close the cassette clamp locking assembly.

4-4 AEC Detector Areas

The SG80/120 may operate with an Ion Chamber Detector. For further information about operation of the Ion Chamber Detector, see generator service and operating manuals or automatic exposure control operating manual.

The three field pattern on the front panel of the SG80/120 corresponds to the three detection areas for the Ion Chamber Detector.

4-5 Alignment

It is important that the X-Ray tube is accurately centered with the Bucky transversely. If the alignment is not accurate, density cut-off at the edges of the film and appearance of grid patterns may be found. The alignment is not critical when an anti-diffusion grid is used. In this case, tilted tube techniques may be used without undue cut-off.

NOTE: The cassette tray handle is marked to indicate the vertical center of the bucky. To assure the bucky is vertically aligned with the X-ray beam, move the bucky or the tube in order the collimator light is aligned with this center mark. For further information, see also collimator operating manual.

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4-6 Frontal Panel

The bucky assembly mechanism and grid can be easily accessed by removing the front panel of the SG80/120. Loosen the screws that hold the front panel to the bucky support and remove it with care (Fig 4.5).

ILLUSTRATION 9-4
Front Panel Removal

4-7 SG120-Specific Funtionalities

4-7-1 Bucky Rotation

It is possible to rotate the SG120 bucky assembly SG120 from 0º to 180º. The rotation movement is permitted means of the lock lever located on the back side of the bucky assembly.

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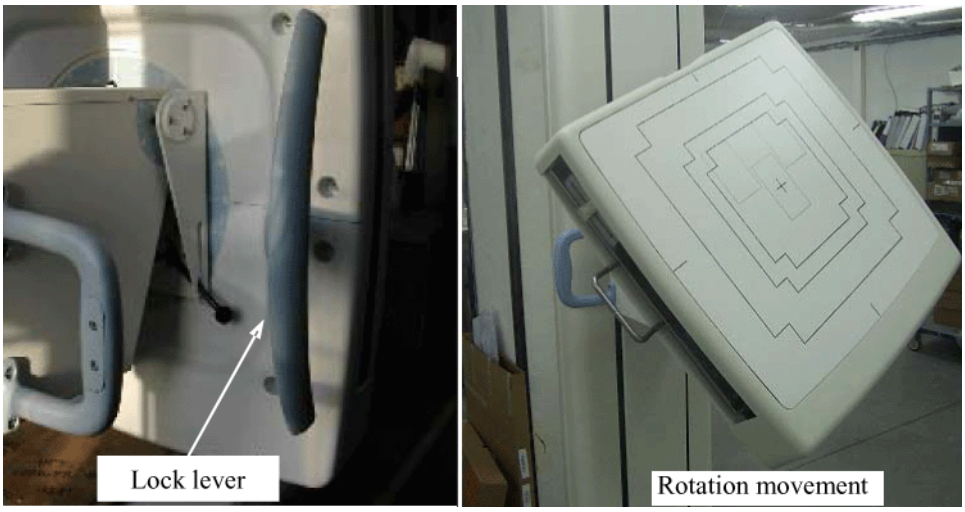
ILLUSTRATION 9-5
Bucky Rotation



Procedure: See ILLUSTRATION 9-5

1. 1. Release the lock lever .
2. 2. Rotate the bucky to position
3. 3. Put the lock lever back into locked position.

NOTE: The bucky can be rotated CW (clockwise) or CCW (counter-clockwise). To avoid degradation of image quality and loss of bucky functionality, it is recommended not to perform exposures with the bucky in other position than 0 degrees or 180 degrees. The bucky is designed to operate only at 0 degree or 180 degree positions, but will function in a range within 30 degrees of these positions. The image quality may be degraded, however.

4-7-2 Bucky Angulation

The SG120 bucky assembly can be angulated in a range that varies from -20 degrees to 90 degrees. The bucky in locked means of the electro-mechanical detents located in the bucky support assembly. The angulation movement is left free when activating one of the pushbuttons located behind the bucky support.

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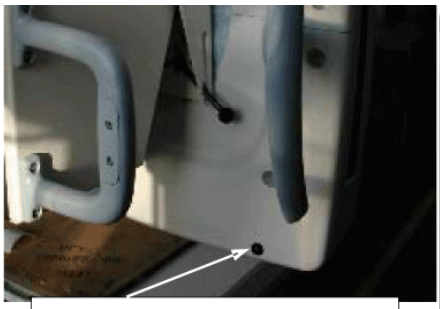
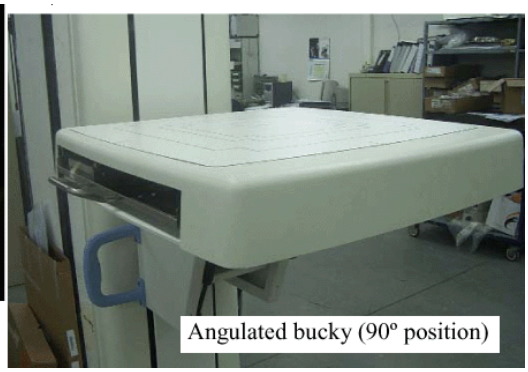
ILLUSTRATION 9-6
Bucky Angulation



Angulation pushbuttons (one on each side)



Angulated bucky (90º position)

Procedure: See ILLUSTRATION 9-6

1. Press one of pushbuttons located behind the bucky support

2.Keeping the push-button pressed, angulate the bucky to the desired position.

3.Release the push-button in order the bucky to remain locked.

SECTION 5
PERIODIC MAINTENANCE

5-1 Maintenance Information

In order to assure continued safe performance of x-ray equipment, a periodic maintenance program must be established. It is the owner's responsibility to supply or arrange for this. After installation, maintenance should be performed on the SG80/120 every eighteen months. The equipment should be cleaned frequently, particularly if corroding chemicals are present. Clean stainless steel surfaces (patient support side rails) with a plastic scouring pad (Scotchbrite or similar). Clean other surfaces with a cloth moistened in warm water with mild soap. Wipe with a cloth moistened in clean water.

DO NOT USE CLEANERS OR SOLVENTS OF ANY KIND AS THY MAY DULL THE FINISH OR BLUR THE LETTERING. POLISH WITH CLEAN WATER OR PASTE WAX. DO NOT US A WAX CONTAINING A CLEANING SUBSTANCE.

NEVER ATTEMPT TO CLEAN ANY PART OF THE TABLE WHEN THE SG80/120 IS POWERED "ON". SWITCH OFF LINE POWER SUPPLY AND THE X-RAY GENERATOR BEFORE CLEANING.

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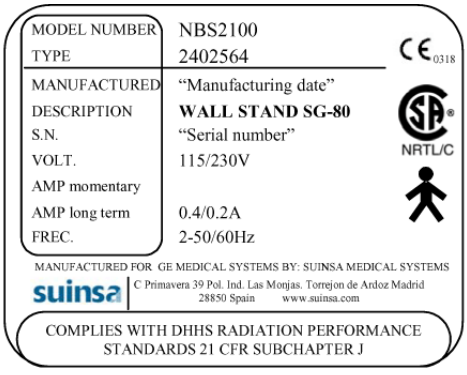
MAINTENANCE ITEM	FREQUENCY (MONTHS)	PROCEDURE
GENERAL		
Visual Inspection	18	Check for debris that would indicate abnormal wear
General cleaning and painting	As required	Wipe exterior parts using soft cloth, water and mils soap. Vacuum interior if any dust or lints is present
Functional checks	18	Perform tasks described in SG80/ 120 Service Manual
Electrical checks	18	Inspect and replace any damaged cables or connectors. Check grounding
MECHANICAL		
Counterweight chain	18	Inspect and grease length of chains. Replace if excessively rusty
Carriage roller bearing inspection	18	Clear roller bearing and tracks
Vertical lock	18	Lock notched rail. General cleaning. Functional check (see Service Manual)

Only service personnel specifically trained on medical x-ray equipment should work on or maintain this equipment.

SECTION 6
LABELING


MODEL NUMBER NBS2100
TYPE 2402564
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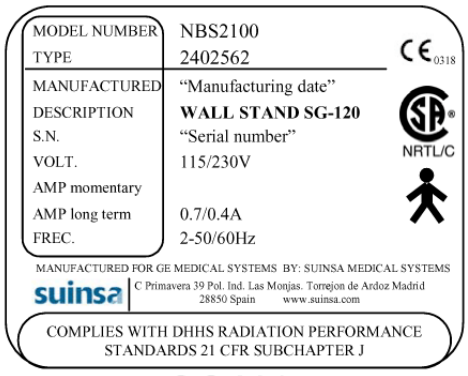
DESCRIPTION WALL STAND SG-80
S.N. "Serial number"
VOLT. 115/230V
AMP momentary
AMP long term 0.4/0.2A
FREC. 2-50/60Hz
NRTL/C
MANUFACTURED FOR GE MEDICAL SYSTEMS BY: SUINSA MEDICAL SYSTEMS
suinsa
C Primavera 39 Pol. Ind. Las Monjas. Torrejon de Ardoz Madrid 28850 Spain www.suinsa.com
COMPLIES WITH DHHS RADIATION PERFORMANCE STANDARDS 21 CFR SUBCHAPTER J

SG80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S.N. "Serial number"
VOLT. 115/230V
AMP momentary
AMP long term 0.7/0.4A
FREC. 2-50/60Hz
NRTL/C
MANUFACTURED FOR GE MEDICAL SYSTEMS BY: SUINSA MEDICAL SYSTEMS
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SECTION 7
SPECIFICATIONS

7-1 Electrical Requirements

Electrical requirements for the SG80/120 vertical bucky stand:

PRODUCT	FREQUENCY (Hz)		VOLTAGE (V)		MAX CURRENT (A)	
	MIN	MAX	MIN	MAX	Moment.	Continu-ous
SG80/120	50	60	115	230	0.4	0.2

7-2 Product Dimensions

RODUCT	DIMENSIONS					WEIGHT
	DEPTH		WIDTH		HEIGHT	
	MAX	MIN	MAX	MIN		
SG80	373 mm	373 mm	652 mm	652 mm	2235 mm	180 Kg
	14.69 in	14.69 in	25.67 in	25.67 in	87.99 in	396.9 lbs
SG80 W/ SPACER	637 mm	637 mm	652 mm	652 mm	2235 mm	194 kg
	25.08 in	25.08 in	25.67 in	25.67 in	87.99 in	427.8 lbs
SG120	927 mm	687 mm	915 mm	652 mm	2235 mm	220 kg
	36.5 in	27.05 in	36.02 in	25.67 in	87.99 in	485.1 lbs

7-3 Crate Dimensions

The SG80/120 is packed in only one crate with the next dimensions:

PRODUCT	DIMENSIONS			WEIGHT
	DEPTH	WIDTH	HEIGHT	
SG80	940 mm	2410 mm	890 mm	80 kg
	37.01 in	94.88 in	35.04 in	176.4 lbs
SG120	940 mm	2410 mm	890 mm	80 kg
	37.01 in	94.88 in	35.04 in	176.4 lbs

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7-4 SG120 Specifications

7-4-1 Wall Stand “General”

Parameter	Specification
Weight	220kg (485.1 lbs)
Height	2235 mm (87.99 in)
Min. Width	652 mm (25.67 in)
Max. Width	915 mm (36.02 in)
Min. Depth	687 mm (27.05 in)
Max. Depth	927 mm (36.5 in)
Front panel height	64.2 cm (25.2 in)
Front panel width	65 cm (25.6 in)
Distance Front Panel to Film Plane	5.8 cm (2.28 in)
Min. Height (Bucky vertical)	33 cm (13.1 in)
Max. Height (Bucky vertical)	190.5 cm (75 in)
Min. Height (Bucky horizontal)	63.5 cm (25 in)
Max. Height (Bucky horizontal)	213 cm (83.9 in)
Bucky rotation range	0° to 180°
Bucky Angulation range	-20° to 90°.
Grid Holding Force	>196N
Wall stand panel Filtration	Maximum 0.65 Al equivalency at 100 kVp
Bucky Loading	Left hand or Right hand
Cassette Load	Left Hand (Right hand load field configurable)
Power Supply	Single phase voltage: 115, 230V+/-10%+ground
Line Frequency	50/60 Hz
Max. Current (Moment.)	0,4
Max. Current (Continuous)	0,2
Panel to front column distance	550 mm (21.65 in)
Panel to front cover distance	483 mm (19.01 in)

7-4-2 Wall Stand Bucky

Parameter	Specification
Grid	36L/cm; 180 cm focus
Cassette Size Sensing	3 cm×18 cm (5 in.×7 in.) minimum to 35 cm×43 cm (14 in.×17 in.) maximum

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CHAPTER 10
SG–100 VERTICAL BUCKY STAND

SECTION 1
INTRODUCTION

The SG-100/SG-120 system is defined as a Tilting/Rotating Vertical Bucky Stand suitable for providing common radiographic examinations, including chest films and oblique angle radiography. Combined with suitable X-ray tube supports, tubes and generators, the SG-100/SG-120 is able to provide vertical and horizontal off-table radiography.

The SG-100/SG-120 allows off-table radiographies of skull and spine in horizontal and vertical attitudes and a variety of radiographies with a patient standing, recumbent, sitting on a wheelchair, or on a stretcher.

ILLUSTRATION 10-1
Example, SG–100 Shown

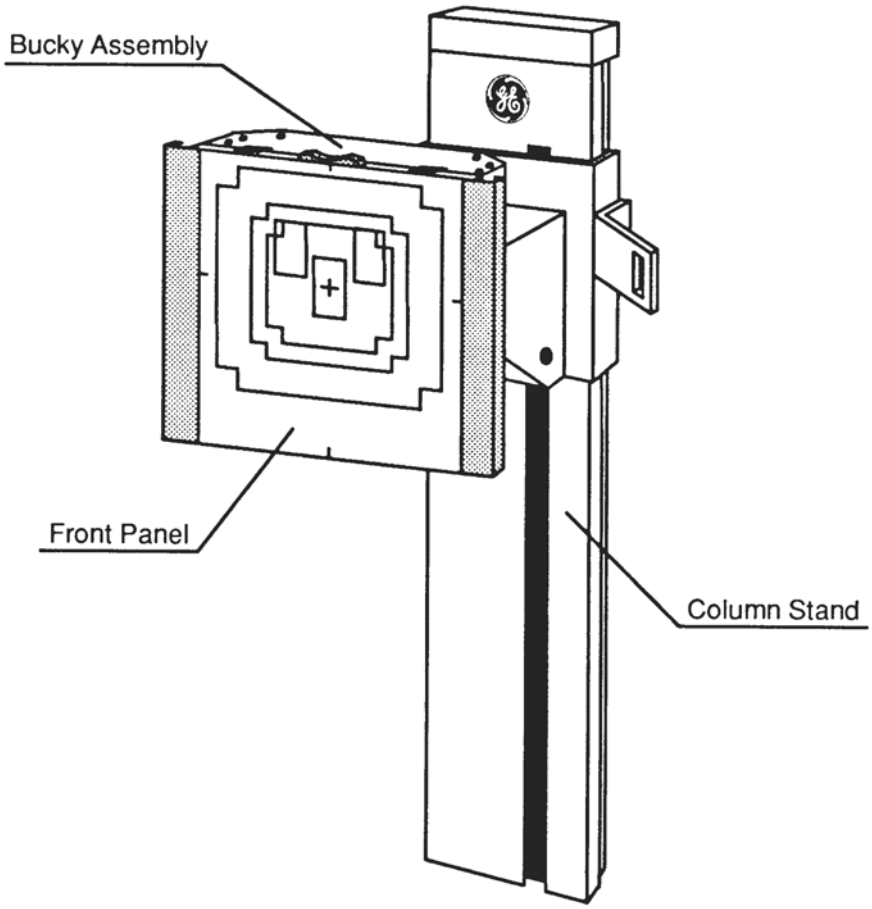

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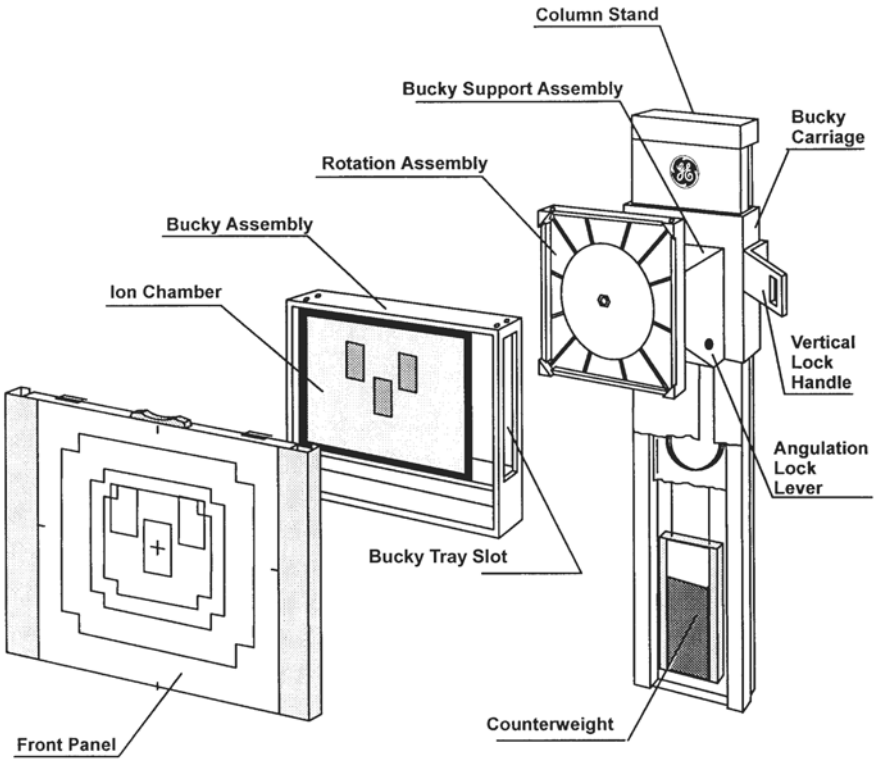
ILLUSTRATION 10-2
Example, SG–100 componts shown



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SECTION 2
SAFE OPERATION PRECAUTIONS

To ensure efficient and safe operation of equipment keep the Operating Manual with the equipment at all times and periodically review the Operation and the Safe Operation Precautions sections.

FOR CONTINUED SAFE USE OF THIS EQUIPMENT, FOLLOW THE INSTRUCTIONS CONTAINED IN THIS OPERATING MANUAL. STUDY THIS MANUAL CAREFULLY BEFORE USING THE EQUIPMENT AND KEEP IT AT HAND FOR QUICK REFERENCE.

UNITED STATES FEDERAL LAW RESTRICTS THIS DEVICE TO USE BY OR ON THE ORDER OF A PHYSICIAN.

RADIOGRAPHIC EQUIPMENT MUST BE OPERATED BY QUALIFIED PERSONNEL AND ONLY AFTER SUFFICIENT TRAINING.

IT IS THE RESPONSIBILITY OF THE OPERATOR TO ENSURE THE SAFETY OF THE PATIENT WHILE THE MACHINE IS IN OPERATION BY CHECKING PROPER PATIENT POSITIONING AND USING THE EQUIPMENT PROTECTIVE DEVICES.

INJURY IS POSSIBLE WHEN PLACING/HANGING ACCESSORIES FROM VERTICAL BUCKY STAND OR USING THE VERTICAL BUCKY STAND AS A SUPPORT. DO NOT HANG ACCESSORIES, LEAN AGAINST OR USE AS A PATIENT SUPPORT.

SECTION 3
OPERATION

3-1General Description

The SG-100/SG-120 Vertical Bucky Stand provides several different bucky positioning alternatives such as vertical movement, rotation and angulation.

SCALES – A height scale in inches or centimeters is provided for easy reference of the Bucky position.

Angulation and rotation scales are also provided for accurate positioning of the Bucky.

3-2Vertical Positioning

The Bucky is held in vertical position by electro-mechanical locks backed up by a mechanical safety lock.

By operating the vertical lock handle (located on the left or right side of the SG–100 depending on the model) the electro-mechanical locks are released and the carriage can be moved up or down, for infinite vertical positioning within its travel range. Refer to ILLUSTRATION 10-3.

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Vertical Bucky travel:

- Top edge of Bucky in vertical position: from 24.57” (624 mm) to 72.60” (1844 mm).
- Top edge of Bucky in horizontal position: from 20.77” (527.5 mm) to 68.07” (1729 mm).
  Tolerance: + 0.0” (0 mm), –0.6” (15 mm)

The mechanical backup lock engages within 1/2” (12.7 mm) of vertical travel in the event the holding power (44 lbs/19.8 kg) of the electromagnetic locks is exceeded, or in the event of lock failure or an unbalanced condition between the Bucky carriage assembly and the counterweights in the vertical column.

The mechanical backup lock is capable of supporting 176 Lbs (79.2 kg).

3-3Patient Support Legs

When the Bucky is in the horizontal position, two foldable legs can be used to allow a patient to sit on the Bucky. To unfold the legs, pull the lock release knob located on the right-side leg.

WHEN USING PATIENT SUPPORT LEGS, ENSURE THEY ARE FIXED IN A POSITION THAT CANNOT INJURE THE PATIENT OR DAMAGE THE EQUIPMENT.

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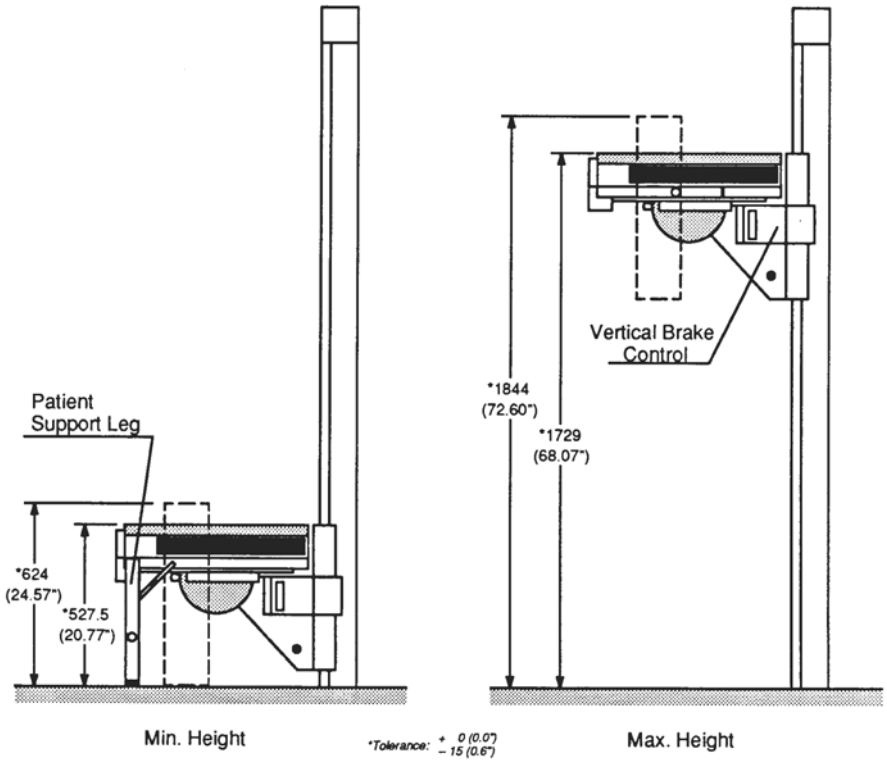
ILLUSTRATION 10-3
VERTICAL POSITIONING



3-4Bucky Rotation

The Bucky can be rotated from 0° to 180°. A rotation lock, located behind the Bucky, holds the Bucky in position. Refer to ILLUSTRATION 10-4.

To change position release the lock lever, rotate the Bucky to the desired position and put the lock lever back into locked position. Depending on the model, the Bucky can be rotated clockwise or counter-clockwise. The ILLUSTRATION 10-4 shows counterclockwise rotation.

The Bucky is designed to operate at 0° and 180° only.

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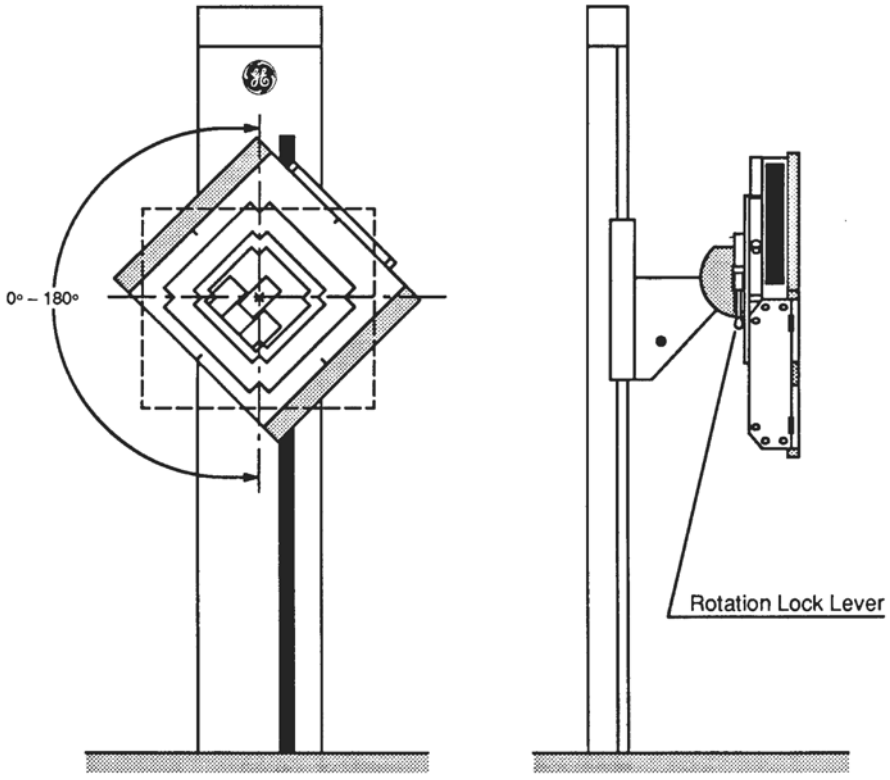
Exposures should not be made with the Bucky in any other position as this may result in a degradation of image quality and loss of Bucky functionality.

NOTICE

WHILE EXPOSURES WITHIN 30° OF THE 0° AND 180° POSITIONS ARE NOT RECOMMENDED, THE BUCKY WILL FUNCTION IN THIS RANGE. A DEGRADATION IN IMAGE QUALITY MAY RESULT, HOWEVER.

ILLUSTRATION 10-4
BUCKY ROTATION



3-5Bucky Angulation

Bucky angulation range varies from –20° to 90°. Refer to ILLUSTRATION 10-5. Angulation position is held by an electro-mechanical detent lock, located behind the Bucky in the Bucky support assembly. The detent lock latches the Bucky in position in 5° increments. To change Bucky angulation, press one of the angulation lock pushbuttons on either side of the Bucky support assembly and move the Bucky to the desired position.

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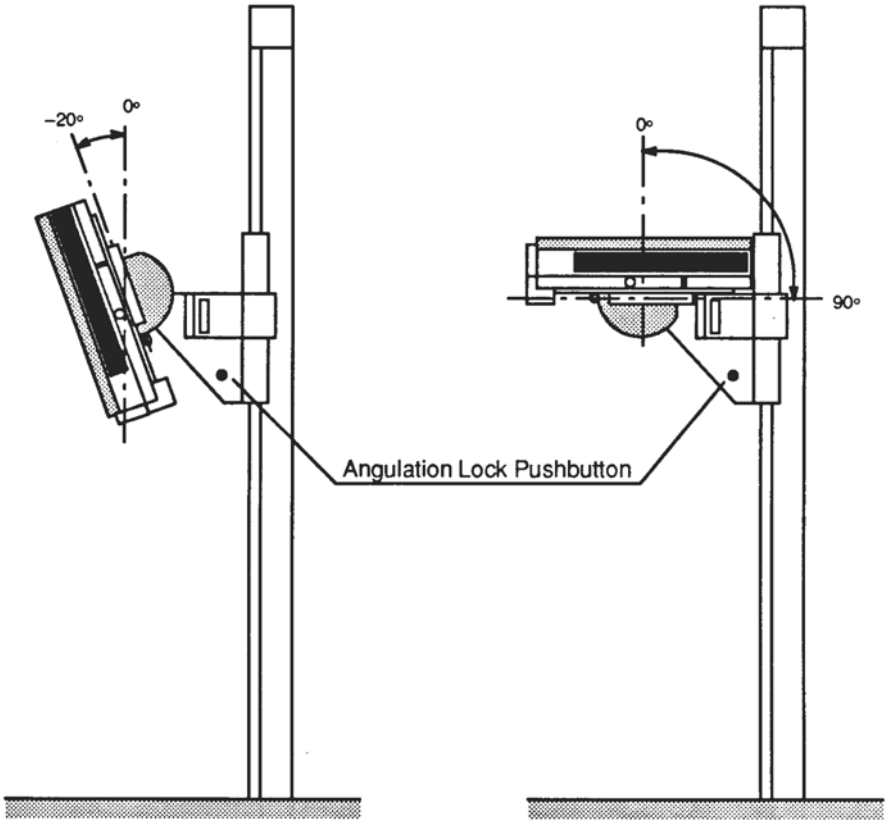
ILLUSTRATION 10-5
BUCKY ANGULATION



3-6Hinged Front Panel

A hinged front panel enables easy access to the Bucky grid and mechanism. Refer to ILLUSTRATION 10-6.

To open the panel, turn the thumb screws on the bottom of the panel then lift the panel up. A safety latch on the right can be used to maintain the panel open.

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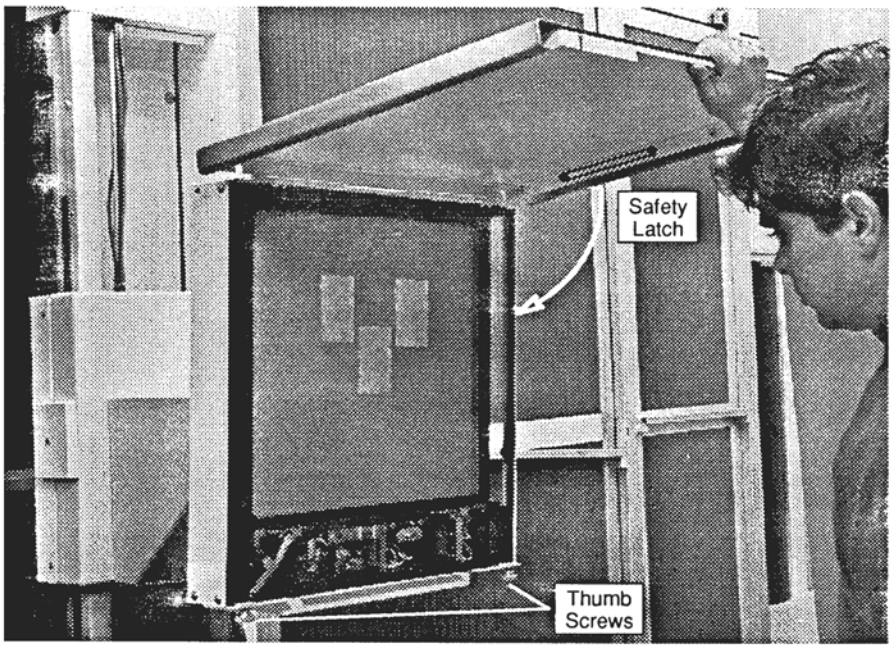
ILLUSTRATION 10-6
LIFTING FRONT HINGED PANEL



WARNING

HAZARDOUS VOLTAGE CAN CAUSE SEVERE INJURY OR DEATH. WHEN CHANGING/REPLACING GRID, TURN OFF POWER.

3-7Cassette Loading

The SG–100 is equipped with a manual cassette tray which is inserted into the Bucky tray slot.

3-8Manual Cassette Tray

The manual cassette tray accepts cassette sizes ranging from 5” x 7” (12.70 cm x 17.78 cm) through 14” x 17” (35.56 cm x 43.18 cm).

Cassette clamps automatically center the cassette transversely in the tray and securely hold it in place. The operator must position the cassette vertically by inserting the cassette support bracket into the holes in the cassette tray corresponding to the given cassette size.

To load a cassette:

1. Pull the cassette tray out of the Bucky.
2. Open cassette-clamp locking assembly, then spread out and separate the clamps.

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3. Insert the cassette support bracket into the appropriate holes.

4. Insert the cassette between the cassette clamps, resting it on the cassette support bracket, then reposition the clamps against the cassette and close the cassette-clamp locking assembly.

5. Push the cassette tray back into the Bucky.

NOTE: To prevent damage to the cassette-clamp locking assembly always close it prior to inserting (pushing) the cassette tray into the Bucky.

NOTE: Normally the cassette tray does not have to be completely removed from the Bucky in order to load a cassette. Cassettes may be inserted in the tray by pulling the tray until movement is stopped by the catch on the lower rear of the tray.

However, if it is desired to remove the tray from the Bucky, pull the tray out until it is stopped by the catch, then press the catch against the tray bottom and hold it while sliding the tray out.

NOTE: When equipped with a cassette-size-sensing tray the SG–100 supports automatic collimation. The tray must be inserted all the way into the Bucky to implement automatic collimation. If the tray is not inserted all the way into the Bucky, the collimator will not switch to automatic collimation.

NOTE: Use caution to prevent deformation of the cassette sensing arm. Its angular shape is important in obtaining accurate field placement. If the arm is bent it must be replaced. Attempts should not be made to straighten the sensing arm if it has been bent or deformed.

3-9Cassette Removal

3-10Manual Cassette Tray

To remove a cassette from the manual cassette tray, pull the tray out fully by its handle. Pull up on the tightening lever and pull it back away from the cassette. The cassette is now free to be removed.

3-11AEC Detector Areas

The SG–100 Vertical Bucky Stand supports an Ion Chamber Detector. Complete operating details for the Ion Chamber Detector are given in the generator operating manual or automatic exposure control operating manual.

The three field pattern on the front panel of the SG–100 Vertical Bucky Stand matches to the three sensing areas of the Ion Chamber Detector.

3-12Alignment

It is important that the X-ray tube unit be transversely centered accurately with the center of the Bucky. Density cutoff at the edges of the film and appearance of grid patterns indicate inaccurate transverse alignment. With an anti-diffusion grid verti-

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cal alignment is not critical, and tilted tube techniques may be used without undue cutoff.

3-13Manual Cassette Tray

The center of the cassette tray handle is marked to indicate the vertical center of the bucky. Move the Bucky or the tube in order to align the collimator light with this center

mark. This assures that the Bucky is aligned vertically with the X-ray beam (see also collimator operating manual). The Bucky handle may need to be pulled out to allow the collimator light to shine on it.

3-14Alignment for Automatic Collimation

Systems using an automatic collimator require accurate positioning for the tube unit and Bucky. Exposures will be permitted at specific source-to-image distances only.

Angular positions of the collimator are sensed to determine the mode of operation of the collimator. The tube unit must be oriented with the X-ray beam directed toward the Bucky within $\pm$ 10° for automatic operation of the collimator. If these conditions are not met, the collimator will be in the manual mode of operation.

For complete details, refer to the collimator operating manual.

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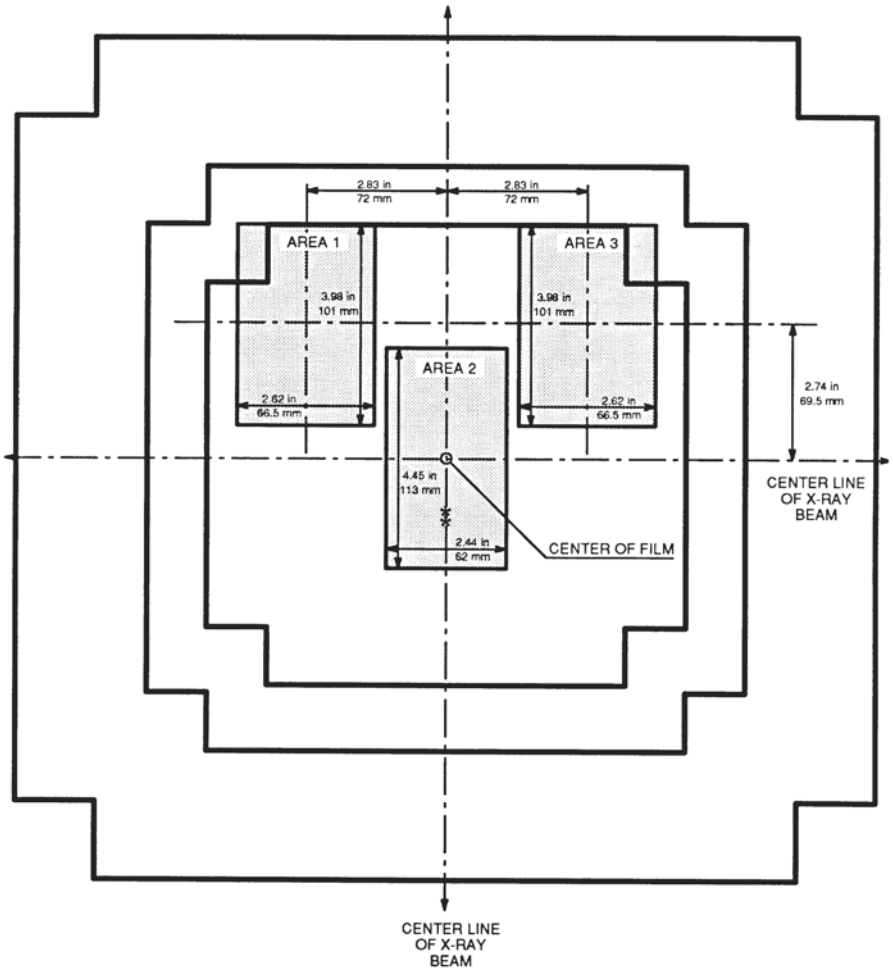
ILLUSTRATION 10-7
FRONT PANEL AEC DETECTOR AREAS



* UNLESS CASSETTE IS ECCENTRICALLY POSITIONED

SECTION 4
SPECIFICATIONS

4-1General Dimensions & Weight

DIMENSIONS

Height	84.88 in	2156 mm
Width	26.93 in	684 mm
Depth	25.82 in	656 mm

(Refer to Illustration "General Dimensions").

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WEIGHT

Weight 409 lb ..... 186 kg

4-2Column Assembly

Height	84.88 in	2156 mm
Width	13.86 in	352 mm
Depth	4.98 in	126.5mm

(Refer to Illustration "General Dimensions").

4-3Front Panel

Front Panel Height	23.23 in	590 mm
Front Panel Width	26.93 in	684 mm

(Refer to Illustration "General Dimensions").

Filtration ..... 0.65 mm Al

4-4Power Requirements

Single phase voltage ..... 115/220 V ± 10% + ground

Line frequency ..... 50 / 60 Hz

Maximum power ..... 100 VA for lock board

150 VA for Bucky

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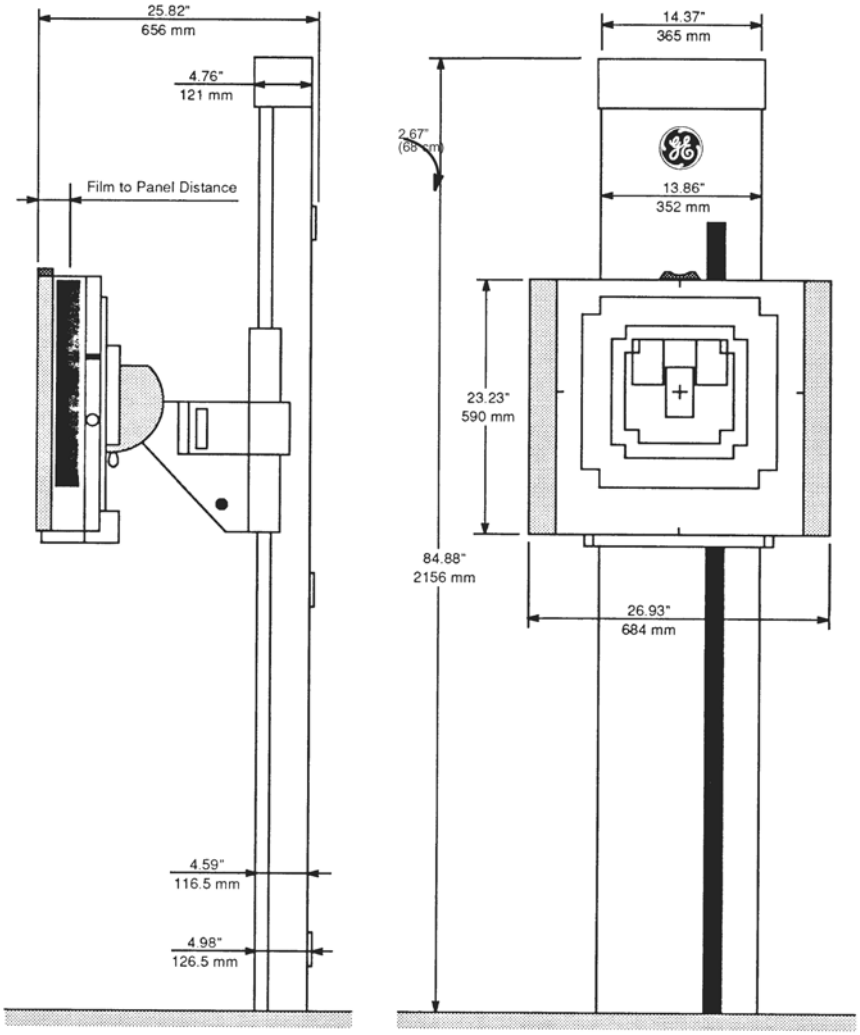
4-5Bucky

ILLUSTRATION 10-8
GENERAL DIMENSIONS



4-6Accessories & Options

The following accessories and options are available for use with the SG–100 Vertical Bucky Stand. For information concerning the items consult your local GE representative.

- Head and Hip Clamps.
- Compression Band.
- 10 cm to 90 cm External Cassette Holder.
- Anti–Diffusion Grid options.
- Ion Chamber Detector (standard or optional depending on Bucky model).

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CHAPTER 11
JEDI GENERATOR

SECTION 1
INTRODUCTION

TABLE 11-1
ALTITUDE AND ATMOSPHERIC PRESSURE

PRODUCT OR COMPONENT	ALTITUDE				ATMOSPHERIC PRESSURE			
	IN–USE		STORAGE		IN–USE		STORAGE	
	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.
Generator	–30.5 (–100 ft.)	2440 m (8005 ft.)	–30.5 m (–100 ft.)	3048 m (10000 ft.)	10 psi (69 kPa)	15.4 psi (106 kPa)	7 psi (48 kPa)	15.4 psi (106 kPa)

TABLE 11-2
HEATS OUTPUTS (BY COMPONENT)

PRODUCT OR COMPONENT	MAXIMUM HEAT OUTPUT (BTU/HR)	MAXIMUM HEAT OUTPUT (WATTS)
	IN–USE	IN–USE
Generator	2036	597

SECTION 2
RADIATION PROTECTION

Because X–ray equipment produces radiation, special precautions may need to be taken or special site modifications may be required. The General Electric Company does not make recommendations regarding radiation protection. It is the purchaser's responsibility to consult a radiation physicist for advice on radiation protection in X–ray rooms.

SECTION 3
SYSTEMS CABINET SPECIFICATIONS

The JEDI generator is available in two three–phase models (65 kW and 80 kW).

3-1Generator Cabinet Specifications

See ILLUSTRATION 11-1 and TABLE 11-3

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ILLUSTRATION 11-1
JEDI GENERATOR CABINET

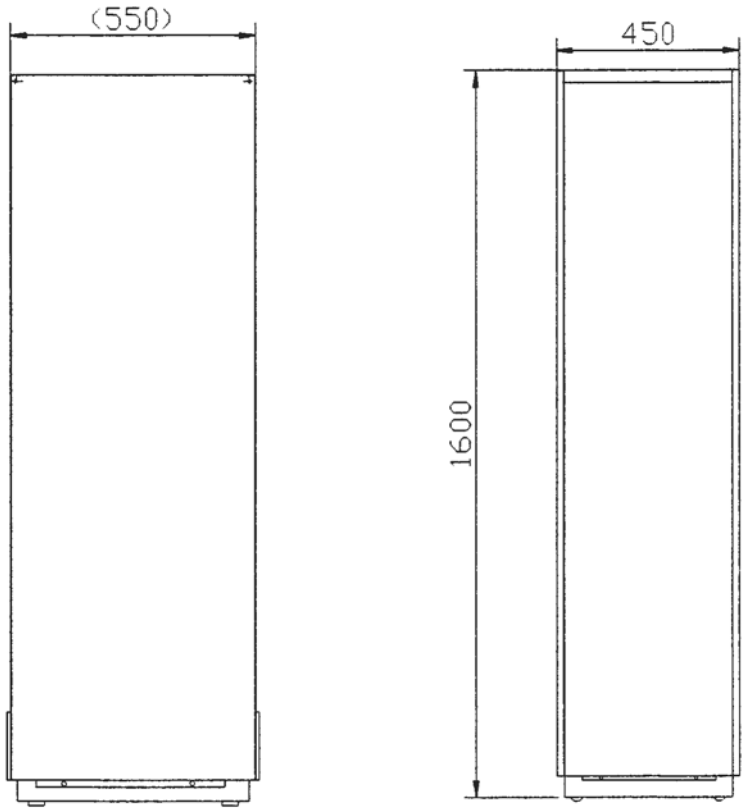

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TABLE 11-3
GENERAL CABINET SPECIFICATIONS

Dimensions	Generator Cabinet
Height:	1600 mm
Width:	550 mm
Depth:	450 mm
Weight:	150kg

NOTE: All specifications do not include measurement instumentation accuracy.

3-2General Input Power Specifications

TABLE 11-4
MODEL DEPENDENT SPECIFICATIONS

PARAMETER	JEDI GENERATOR
Input Voltage	380/400/415/440/460/480VAC three phase and Ground without neutral
Daily Voltage Variations	+/– 10% (in this range, the generator shall operate without any derating in accuracy)
Line Impedance Specification	IEC Specification
Line Impedance	The apparent line impedance guaranteed by the customer should be equal or less than the values indicated below, according to the voltage value and the commercial power of the generator. Voltage range (V) line impedance (Ohms) 3 (phase) 65kW 80 kW 380 0.12 0.09 415 0.14 0.11 440 0.15 0.125 480 0.18 0.15
HV cable type	IB EEC: 22mm cable de Lyon (<=150pF/m) USA: 22mm DSI (<=165pF/m) EEC: 16mm Claymount (<=165pF/m) HV cable connector=Federal standard
Ground Wire	Same as power cable
Inrush Current	600A
Normal Frequency	50/60Hz
Daily Frequency Variation	+/–6%

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11-4 Generator Ouput Power:

TABLE 11-5
JEDI GENERATOR POWER

kV	65kW	80kW
40–80	800 mA	1000 mA
100	630 mA	800 mA
125	500 mA	630 mA
150	400 mA	500 mA

The JEDI can deliver the power specified in this output for at least 100ms, depending on the X–ray tube used. Refer to the tube rating charts supplied with the x–ray tube.

In accordance with IEC requirements, TABLE 11-7 defines the reference Current Time Product.

TABLE 11-6
NOMINAL ELECTRIC POWER (1000KV–0.1S):

kW k	65	80
I (max) mA	630	800

TABLE 11-7
PARAMETER SELECTION RANGES OF CONSOLE READOUTS

	All Modes	
Selectable kV	40–150	
Decimal scale	steps of 1kV	Jump of 10kV
Renard scale	40, 41, 42, 44, 46, 48, 50, 52, 55, 57, 60, 63, 66, 70, 73, 77, 81, 85, 90, 96, 102, 109, 117, 125, 133, 141, 150	The next kV displayed is the third Renard step value following the initial display value of kV.

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TABLE 11-8
ACCURACY READINGS ON CONSOLE READOUTS

Mode : 3 point			
Selectable		Resultant	
mA 26%	ms 26A%	mAs 26% increments	
		Non–AEC	0.5 thru 630 mA 32 steps
JEDI 65 kW: 10 thru 800 mA/20 steps	1 thru 630ms 39 steps	AEC	0.5 thru 630 mA 32 steps
JEDI 80 kW: 10 thru 1000 mA/21 steps	1 thru 630ms 39 steps		

		Auto Exposure Control: AEC			
AEC	Technique	Sensing Device	Sensing area	Manual density correction	Post–display: Auto-matic for 5 sec.
AEC	Cassette	Ionization Chamber: up to 2	3 rectangular cells	5 steps, –2thru +2, by 26% increment	mAs, ms and mA

Mode: 2 point	
User Selectable	
	MAs 26% increments
Non–AEC	0.5 thru 630mAs 32 steps
AEC	0.5 thru 500mAs 31 steps

Constancy of AIR KERMA
Nominal Shortest Irradiation Time:
80kV, 10ms – without correction
80kV, 7ms – with correction by HV Generator.

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TABLE 11-9
ACCURACY OF CONSOLE READOUTS

NOTE: In RAD mode, kVp accuracy is ensured after 10ms.

	Display before exposure		
Conditions	parameter	mode	Basic Accuracy
Radiography Exposure Time <= 40	kVp	all	+/– (3%, +2 kVp)
	mA	all	+/– (10%, +1 mA)
	ms	3 point timer	+/–(5%, +0.5ms)
	ms	AEC (2/3 point)	+/– 5%
	mAs	AEC (2/3 point)	+/– 10%
	mA	AEC (3 point)	+/– 15%
Radiography Exposure Time > 40 ms	kVp	all	+/– (3%, +2 kVp)
	mA	all	+/– (5%, +1 mA)
	ms	3 point timer	+/–(5%, +0.5ms)
	ms	AEC (2/3 point)	+/– 5%
	mAs	AEC (2/3 point)	+/–(5%, +0.1 mAs)
	mA	AEC (3 point)	+/– 10%

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4-1Power Line Requirements

TABLE 11-10
MINIMUM WIRE SIZE (65 KW)

PARAMETER	THREE PHASE GENERATOR – 65 KW											
Input Voltage	**380VAC**		**400 VAC**		**415 VAC**		**440 VAC**		**460 VAC**		**480 VAC**	
Wire Size Length 15 m (50 ft.) 30 m (100 ft.) 46 m (150 ft.) 60 m (200 ft.)	16 mm2 22 mm2 30 mm2 44 mm2	(#6 AWG) (#5 AWG) (#3 AWG) (#1 AWG)	16 mm2 22 mm2 30 mm2 44 mm2	(#6 AWG) (#5 AWG) (#3 AWG) (#1 AWG)	16 mm2 22 mm2 30 mm2 44 mm2	(#6 AWG) (#5 AWG) (#3 AWG) (#1 AWG)	16 mm2 22 mm2 30 mm2 44 mm2	(#6 AWG) (#5 AWG) (#3 AWG) (#1 AWG)	16 mm2 22 mm2 30 mm2 44 mm2	(#6 AWG) (#5 AWG) (#3 AWG) (#1 AWG)	16 mm2 22 mm2 30 mm2 44 mm2	(#6 AWG) (#5 AWG) (#3 AWG) (#1 AWG)

TABLE 11-11
KVA LOAD CHARACTERISTICS 65KW

Phase	3	3	3	3	3	3
Nominal line Voltage (Vac)	380	400	420	440	460	480
Voltage Range (Vac)	+/–10%	+/–10%	+/–10%	+/–10%	+/–10%	+/–10%
Momentary Line Current (Amp)	147	140	133	127	122	117
Continuous Line Current (Amp)	7	6.7	6.2	6 5.	7	5.5
Power demands (kVA)	97	97	97	97	97	97
Frequency	47 / 53Hz and 57/63Hz					

TABLE 11-12
MINIMUM WIRE SIZE (80 KW)

PARAMETER	THREE PHASE GENERATOR – 80 KW											
Input Voltage	**380VAC**		**400 VAC**		**415 VAC**		**440 VAC**		**460 VAC**		**480 VAC**	
Wire Size Length 15 m (50 ft.) 30 m (100 ft.) 46 m (150 ft.) 60 m (200 ft.)	22 mm2 30 mm2 43 mm2 54 mm2	(#5 AWG) (#3 AWG) (#1 AWG) (#0 AWG)	22 mm2 30 mm2 43 mm2 54 mm2	(#5 AWG) (#3 AWG) (#1 AWG) (#0 AWG)	22 mm2 30 mm2 43 mm2 54 mm2	(#5 AWG) (#3 AWG) (#1 AWG) (#0 AWG)	22 mm2 30 mm2 43 mm2 54 mm2	(#5 AWG) (#3 AWG) (#1 AWG) (#0 AWG)	22 mm2 30 mm2 43 mm2 54 mm2	(#5 AWG) (#3 AWG) (#1 AWG) (#0 AWG)	22 mm2 30 mm2 43 mm2 54 mm2	(#5 AWG) (#3 AWG) (#1 AWG) (#0 AWG)

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TABLE 11-13
KVA LOAD CHARACTERISTICS 80KW

Phase	3	3	3	3	3	3
Nominal line Voltage (Vac)	380	400	420	440	460	480
Voltage Range (Vac)	+/–10%	+/–10%	+/–10%	+/–10%	+/–10%	+/–10%
Momentary Line Current (Amp)	190	180	170	163	156	150
Continuous Line Current (Amp)	7	6.7	6.2	6 5.	7	5.5
Power demands (kVA)	125	125	125	125	125	125
Frequency	47 / 53Hz and 57/63Hz					

4-2X–Ray Interlock Systems

”Deadman’s switch” X–ray Control Safety Switch
X–ray emmision is terminated instantly when you release the x–ray control radiography pushbutton.
A special safety circuit uses a signal from second trigger (radiographic exposure) controls transmitted directly via relay contacts to the control circuit of the power inverter. If the microprocessor does not stop x–ray emission after a delay of several milliseconds, inverter operation is inhibited. In this case, a fault signal is sent to the control circuits of the generator.

X–ray Tube Housing Overheat Interlock
If the factory–adjusted temperature of the tube housing goes higher than the permissible level, x–ray emission is terminated.
If it occurs, ask the service Refer to troubleshooting chart.

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CHAPTER 12
ACCESSORIES

SECTION 1
TABLE ACESSORIES

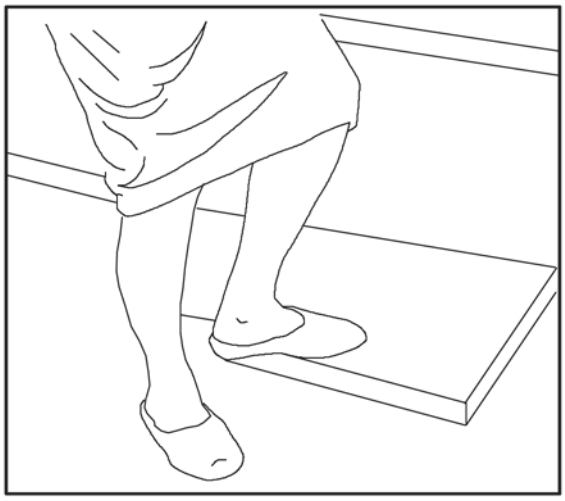
1-1Patient Step

The patient step (ILLUSTRATION 12-1) provides patient convenience getting on and off the table. The step is attached to the underside of the table body to the right of the front support. Table angulation is prevented when the step is pulled out. The white button must be pressed to push the step in.

WARNING

INJURY COULD OCCUR IF PATIENT STEP IS NOT FULLY EXTENDED OUT. VERIFY PATIENT STEP IS FULLY ENGAGED AND ASSIST THE PATIENT ON AND OFF THE TABLE.

ILLUSTRATION 12-1
PATIENT STEP



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1-2Foot Rest

WARNING

TO PREVENT IMPROPER ATTACHMENT AND POTENTIAL INJURY TO PATIENT, USE THIS FOOTREST ONLY ON THE TABLE FOR WHICH IT HAS BEEN ADJUSTED.

NOTICE

Installing the foot rest at the set of slots closest to the end of the tabletop provides easier patient boarding.

The foot rest is engaged on the table top in the same manner as shown for the shoulder rest on ILLUSTRATION 12-2, and is designed to support a 300 lb (136 kg) patient.

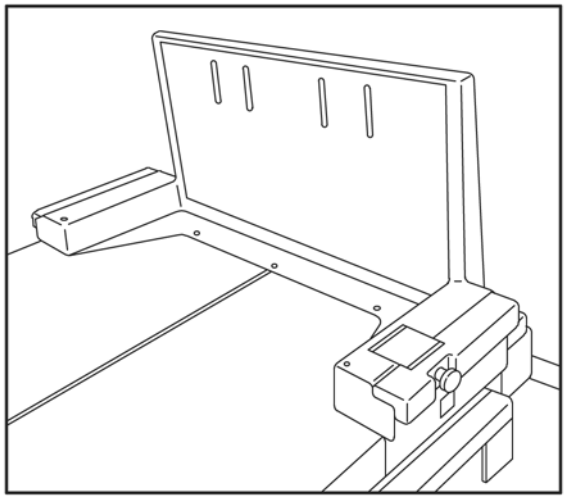
To attach:

1. Push on the safety latches with the thumbs and spread the handles.
2. Place the foot rest on the top adjacent to a set of slots and release the handles.
3. Slide the foot rest until both handles snap into place.

The safety latches will reset to prevent accidental spreading of the handles.

Check that **BOTH** handles have positive engagement by pulling on the foot rest. In case of any difficulties or doubts about the foot rest condition, call a qualified technician.

ILLUSTRATION 12-2
FOOT REST



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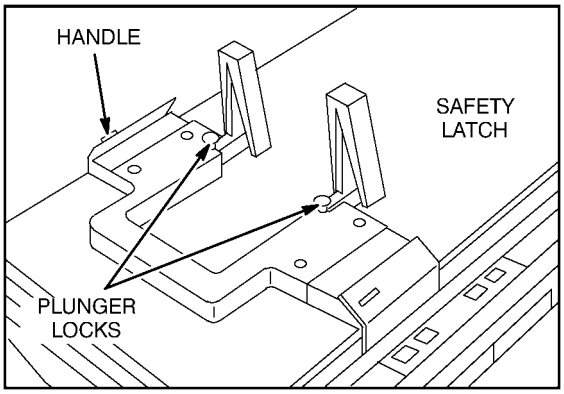
SECTION 2
OPTIONAL TABLE ACCESSORIES

2-1Shoulder Rest

The shoulder rest (Illustration 10–3) is engaged on the table top in the same manner as the foot rest. The plunger locks permit adjustment of the pad position in 1/2” increments.

ILLUSTRATION 12-3
SHOULDER REST

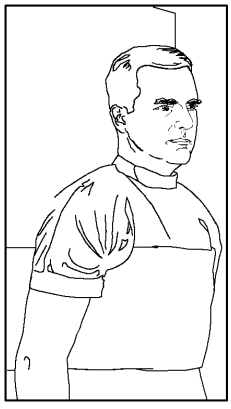


2-2Compression Device

The compression device is not intended to be used for patient support or restraint. It may be engaged at any point along the table top and consists of the front bracket with ratchet, roller and band, and the rear anchor bracket. To use:

1. Position the patient
2. Engage the brackets on the front and rear edges of the table top.
3. Pull up the ratchet handle, pull out the band and hook the rod on the rear bracket.
4. Tighten the band by “cranking” the ratchet handle i.e., move it back and forth.
5. Release the patient by lifting up the ratchet handle and disengaging the band.

ILLUSTRATION 12-4
COMPRESSION DEVICE



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2-3Myelographic Operation

For myelographic procedures, the Horizontal Stop selection located on the table control panel should be off. This inhibits accidental motion of the cone during the procedure.

WARNING

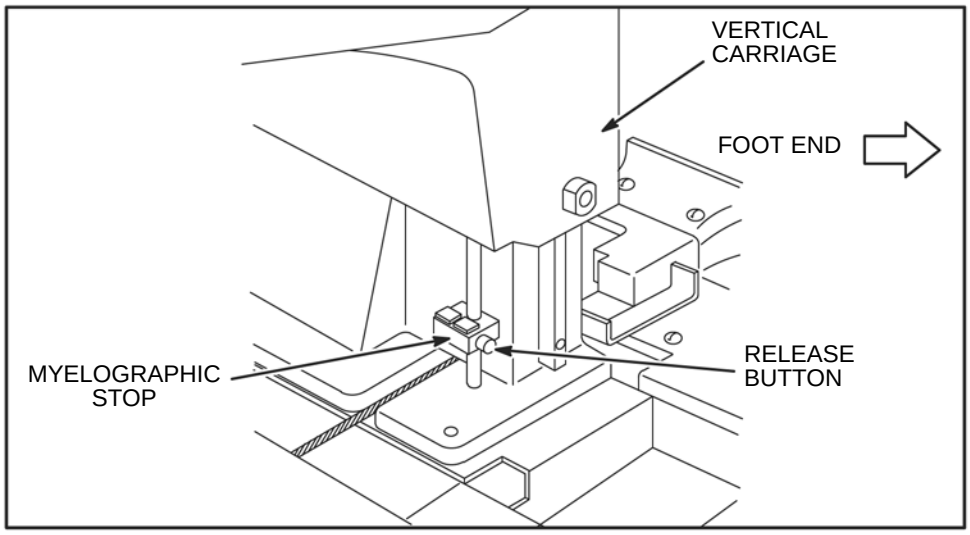
SET THE MANUAL MYELOGRAPHIC STOP ON THE FLUORO CARRIAGE (ILLUSTRATION 12-5) BEFORE BEGINNING THE PROCEDURE.

To set the myelographic stop:

1. Press the button, move stop up or down and release it.
2. Then move the IDD against it to make sure it is firmly seated.

NOTE: Engage the compression lock on the IDD as a precaution.

ILLUSTRATION 12-5
MYELOGRAPHIC STOP



2-4Myelographic Boots (Optional)

These boots are intended for patient's support during myelography and are attached to slots in the standard foot rest. When using these boots, mount the shoulder rest to the table for added safety assurance. THE SHOULDER REST NEED NOT BE IN ACTUAL CONTACT WITH THE PATIENT.

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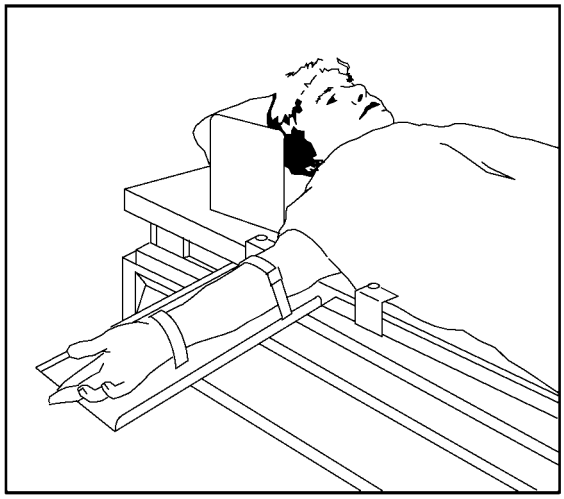
2-5Arm Board (Optional)

The arm board (ILLUSTRATION 12-6) supports the patient's arm during catheterization or other intravenous procedures and attaches over all but the middle of the table top.

To install the arm board on the table top:

1. Check that the lock lever (on underside) is turned so that its eccentric hub is withdrawn into the recess opposite the key on the clamping surface.
2. Back out the clamping screws as required.
3. Engage the arm board on the table by tilting it downward so the key can hook into one of the slots on the underside of the top frame.
4. Then raise it up and firmly tighten the two clamping screws.
5. Turn the lock lever a sufficient amount to obtain a snug fit. The arm board may be pivoted to any desired angle.
6. To install the shield, insert the two prongs in either set of holes adjacent to the clamping screws.

ILLUSTRATION 12-6
ARM BOARD



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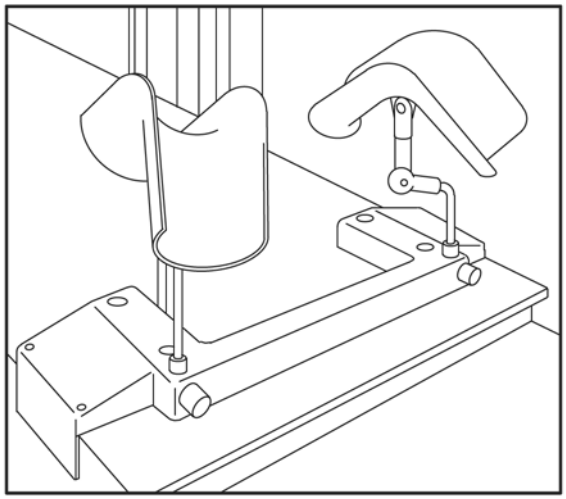
2-6Knee Crutches (Optional)

Used for urological or gynecological examinations the crutch supports for the knees are adjustable (ILLUSTRATION 12-7).

To attach:

1. Spread the hinges on each side,
2. Place on the table top so that the catches on the hinges are roughly in line with a set of notches and release the hinges.
3. A slight movement back and forth is necessary to obtain positive engagement.

ILLUSTRATION 12-7
KNEE CRUTCHES



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2-7Vertical Cassette Holder (Optional)

The vertical cassette holder is used for cross–table radiography. It can be attached to the table top along the entire length. To install the holder;

1. Engage it on the edge of the table top.
2. Slide it to the desired position.
3. Secure by means of the two thumb knobs.

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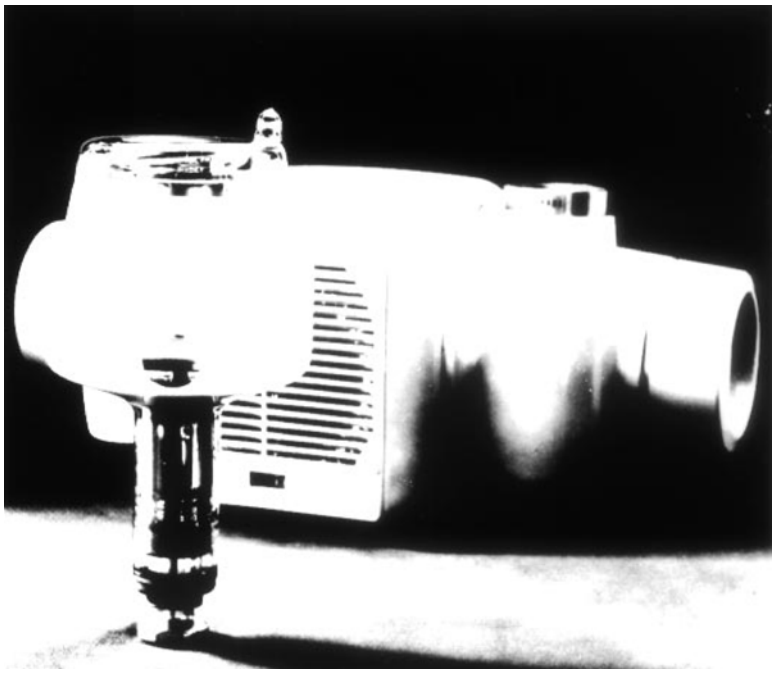
APPENDIX A
MAXIRAY™ 100 TUBE UNITS

ILLUSTRATION A-1
MAXIRAY 100 TUBE UNITS



SECTION 1
APPLICATION

High–speed, 4–inch (100 mm) diameter rotating–anode tube unit and inserts for high–energy radiographic procedures.

SECTION 2
FEATURES

- Polyrhenium™ target, manufactured by General Electric minimizes surface distortion and provides increased radiation output.
- Anode heat storage capacity of 260,000 Joules (350,000 heat units).
- Kelvinite™ high–thermal emittance oxide coatings on anode and rotor provide high anode heat dissipation of 925 watts (75,000 heat units per minute) for improved loading and cooler bearings.

NOTE: Refer to appropriate insert data sheet to obtain the full unit data.

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TABLE A-1
MAXIRAY 100 TUBE UNITS

New Tube Unit	Exchange Tube Unit	Focal Spot	Color
D1179E(FL)	D0579E(FL)	0.6–1.0	Oyster gray
D1279E(FL)	D0679E(FL)	0.6–1.0	Mist gray
*D1172E(09)	*D0572E(09)	0.6–1.0	Oyster gray
*D1272E(09)	*D0672E(09)	0.6–1.0	Mist gray
*D1173E(18)	*D0573E(18)	0.6–1.0	Oyster gray
*D1273E(18)	*D0673E(18)	0.6–1.0	Mist gray
N/A	*D0577E(18)	0.6–1.0	Oyster gray
D1179EG(FL)	D0579EG(FL)	0.6g–1.0g	Oyster gray
D1279EG(FL)	D0679EG(FL)	0.6g–1.0g	Mist gray
N/A	*D0573EG(18)	0.6g–1.0g	Oyster gray
*D1172DH(09)	*D0572DH(09)	0.6–1.5	Oyster gray
*D1272DH(09)	*D0672DH(09)	0.6–1.5	Mist gray
*D1173DH(18)	*D0573DH(18)	0.6–1.5	Oyster gray
*D1273DH(18)	*D0673DH(18)	0.6–1.5	Mist gray
N/A	*D0577DH(18)	0.6–1.5	Oyster gray
N/A	*D0573DF(18)	0.6g–1.5	Oyster gray
*D1279EC(FL)	*D0679EC(FL)	0.6–1.0	Mist gray
*D1279F(FL)	*D0679F(FL)	0.6–1.25	Mist gray
*D1272F(09)	*D0672F(09)	0.6–1.25	Mist gray
*D1173F(09)	*D0573F(09)	0.6–1.25	Mist gray
*D1273F(09)	*D0673F(09)	0.6–1.25	Mist gray
*D1275F(18)	*D0675F(18)	0.6–1.25	Mist gray
*D1175DH(18)	*D0575DH(18)	0.6–1.5	Oyster gray
*D1275DH(18)	*D0675DH(18)	0.6–1.5	Mist Gray
*D1179DL(FL)	*D0579DL(FL)	0.6g–1.5	** Oyster gray
*D1279DL(FL)	*D0679DL(FL)	0.6g–1.5	** Mist gray

*With Pressure Switch. **For Hybrid Applications.

2-1 Tube Housing

Finish – mist gray or oyster gray baked enamel.

Shockproof housing constructed of aluminum. Lined with lead to minimize leakage radiation.

Oil expansion chamber permits fully rated operation in ambient temperature range from 32° F to 104°F (0°C to 40°C) and permits storage or shipment at temperatures as low as –20°F (–29°C) and altitudes up to 20,000 feet (6,096 meters).

Pressure switch mounted in tube housing inhibits exposure if oil pressure due to excessive heat reaches a preset limit.

Maximum voltage anode or cathode to ground – 82 kVp.

Amber indicating lamp installed in blower housing identifies selected tube unit prior to exposure initiation.

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Rating plates on housing list focal spot sizes and serial numbers.

Leakage technique factors:

Radiographic tube unit–150 kVp, 4 mA
Fluoroscopic tube unit–150 kVp, 5 mA

Minimum inherent filtration:

Tube housing – 0.3 mm aluminum at 150 kVp
Tube insert – 0.8 mm aluminum at 150 kVp

2-2 Tube Insert

Glass envelope facilitates “near” omni–directional heat radiation from target to the interior of the housing for improved heat dissipation.

Special treatment of inner surface of glass envelope improves high–voltage stability for consistent technics.

Special anode and cathode design minimizes metal deposits.

Rotor bearing design allows longitudinal thermal expansion of shaft with no increase in friction.

NOTE: A high–speed rotor controller is required for operation of the Maxiray™ 100 Tube Unit.

2-3 Thermal Ratings

Heat Storage Capacity:

- Anode – 260,000 Joules (350,000 heat units)
- Tube Unit – 1,110,000 Joules (1,500,000 heat units)

Maximum Heat Dissipation Rate:

- Anode – 75,000 heat units per minute.
- Tube Unit – 60,000 heat units per minute, blower operating, type 09 or 18 casings (740 watts).
- 75,000 heat units per minute, heat exchanger operating, type FL casings (925 watts).

For single–phase equipment, heat units equal kVp x mA x seconds.

For three–phase, 12–pulse equipment, heat units equal the product of kVp x mA x seconds x 1.35.

Internal oil circulation in the casing provides more uniform oil temperature for improved heat dissipation.

External blower increases air circulation over tube casing for rapid casing heat dissipation.

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Individual fluoroscopic and radiographic exposure limits govern allowable techniques until the heat storage capacity of the anode is reached. Thereafter, continued operation can be maintained only at the limit of the anode dissipation rate of 75,000 heat units per minute until the tube unit capacity of 1,500,000 heat units is reached. The input rate, including stator power, is then limited to 60,000 heat units per minute for the radiographic casing and 75,000 heat units per minute for the fluoroscopic casing.

Both the heat unit values shown for stator power and the heat unit values for exposures must be considered in calculating the average input rates for extended periods of operation.

The average energies attributable to stator power per exposure are as follows:

0–10,000 rpm	8,000 heat units	5,926 Joules
0–3,400 rpm	4,000 heat units	2,960 Joules
3400–10,000 rpm	4,000 heat units	2,960 Joules
Continuous operation (fluoroscopy, normal minute speed)	8,000 heat units/minutes	99 Watts

2-4 Radiographic Ratings

The tube rating charts are based upon a target temperature equivalent to 25% of storage (75% remaining). For heavy duty operation where this temperature is exceeded, 80% of the rating must be used.

2-5 Fluoroscopic Ratings

Rotating Anode

- All focal spot sizes – 6 mA – 150 kVp subject to thermal limitations (900 kVp–mA product up to 150 kVp).

Stationary Anode

- 0.6 mm focus – 5 mA – 110 kVp, 4 mA – 130 kVp.

SECTION 3
WEIGHTS (APPROX.)

	Lbs.	Kg.
NET	65	29.5
SHIPPING	87	39.5

SECTION 4
RELATED PUBLICATIONS

Service Manual	SM D1176

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SECTION 5
WARRANTY

The published Company warranty in effect on date of shipment shall apply. Right reserved to make changes.

SECTION 6
USER SERVICE AND MAINTENANCE

The Maxiray™ 100 Tube Unit requires no routine maintenance other than occasional cleaning of the external parts with a clean cloth. All major maintenance work, including tube replacement, should be done only by qualified personnel.

SECTION 7
LISTINGS

UL Listed
CSA Listed

This product has been designed to meet applicable performance standards for diagnostic x–ray equipment as enunciated by the Department of Health and Human Services pursuant to the Radiation Control of Health and Safety Act.

This X–Ray Tube Unit Assembly is intended to be installed in a GE X–ray apparatus that may or may not be CE Marked. Installing a CE Marked X–Ray Tube Assembly in a non–CE Marked system does not make the whole system CE Marked.

Refer to the X–ray system documentation for X–ray tube unit assembly compatibility, and for system CE Marking information.

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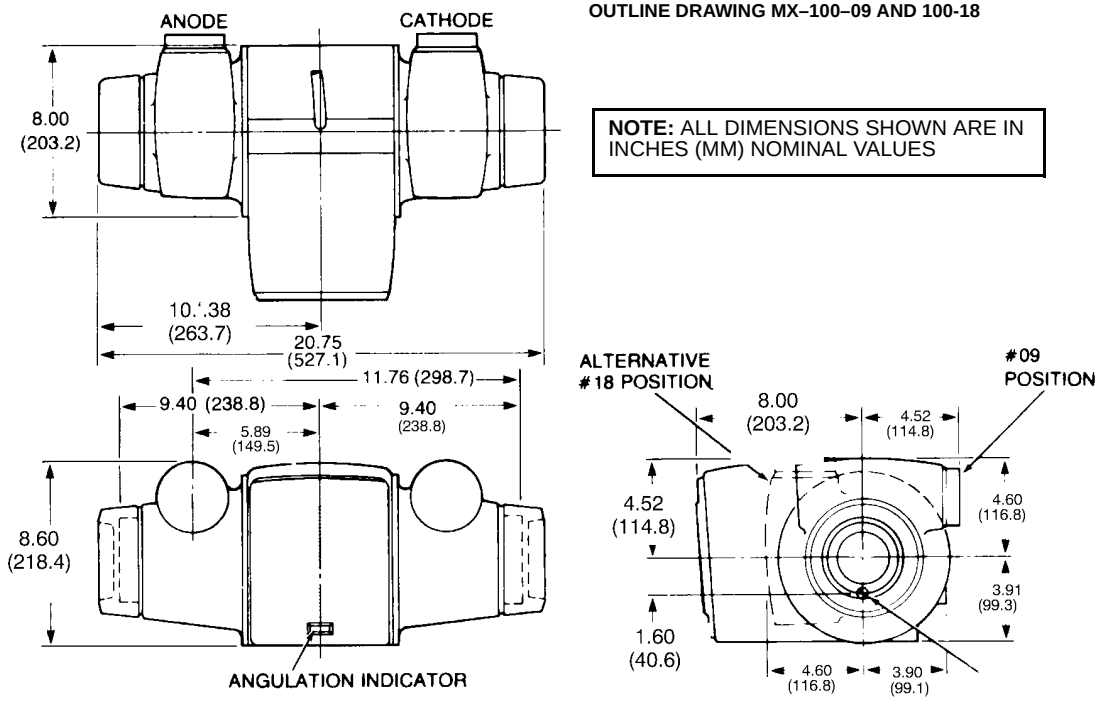
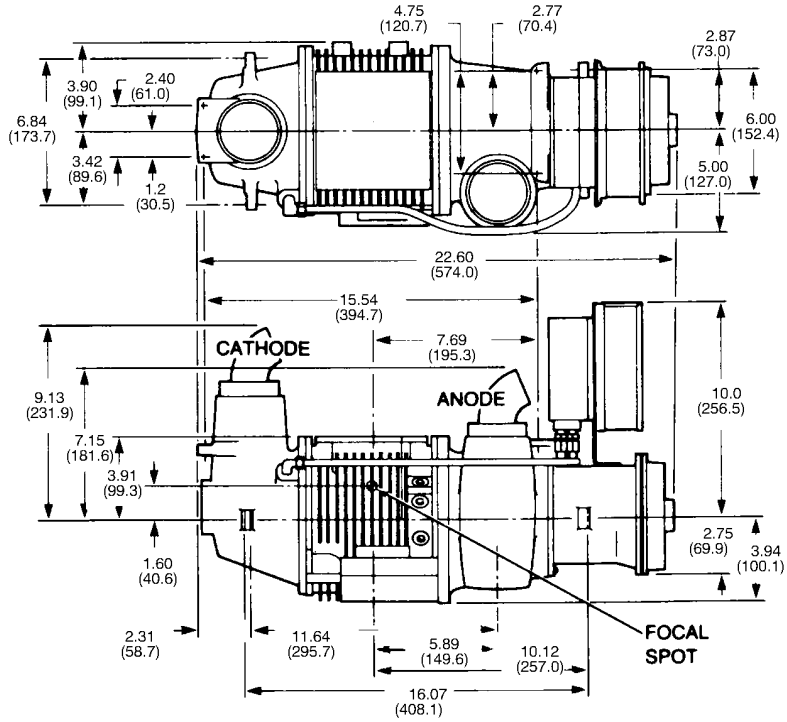
ILLUSTRATION A-2
OUTLINE DRAWING

OUTLINE DRAWING MX–100–09 AND 100-18



NOTE: ALL DIMENSIONS SHOWN ARE IN INCHES (MM) NOMINAL VALUES

OUTLINE DRAWING MX–100–FL



NOTE: ALL DIMENSIONS SHOWN ARE IN INCHES (MM) NOMINAL VALUES

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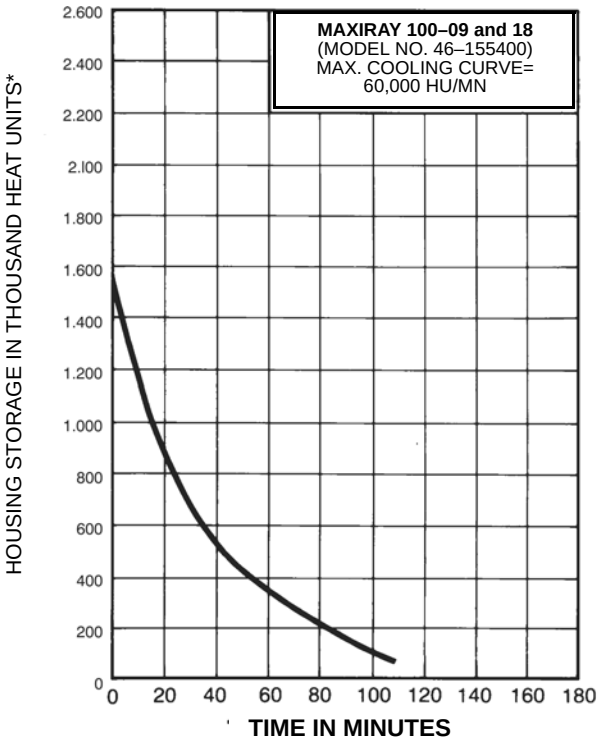
ILLUSTRATION A-3
TUBE HOUSING COOLING CURVE



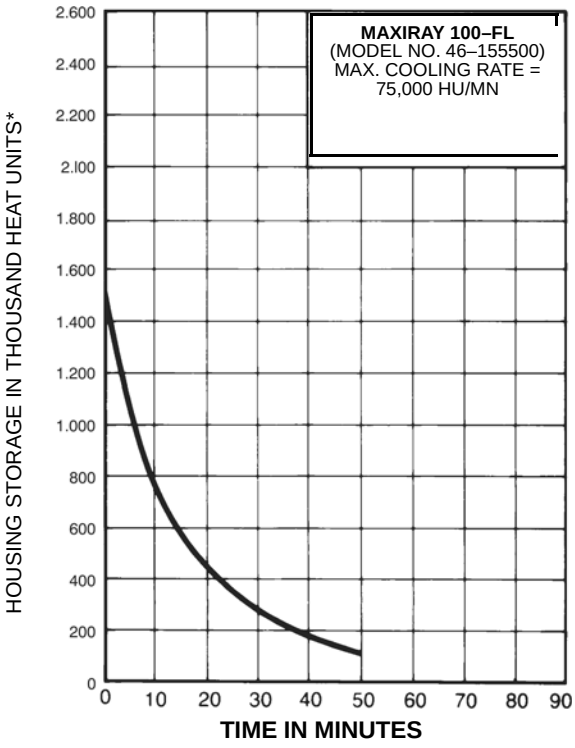
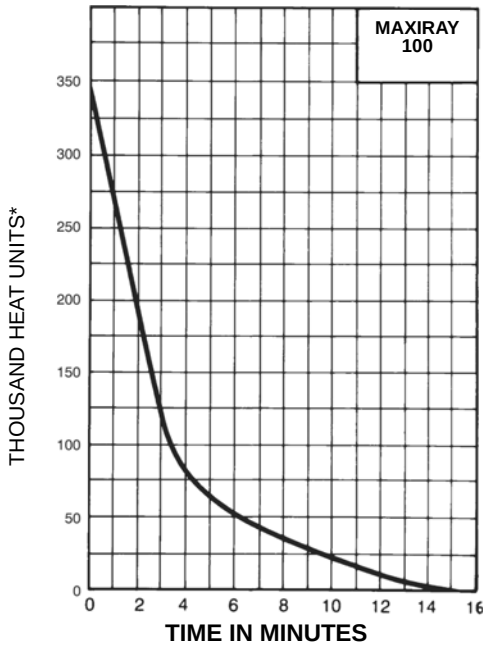


ILLUSTRATION A-4
ANODE COOLING CURVE



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SECTION 8
RADIOGRAPHIC TUBE RATINGS

These charts are based on a target temperature equivalent to 25% of storage (75% remaining). For heavy–duty operation where this temperature is exceeded, 80% of the rating must be used.

8-1 Warm–Up Procedure

The first exposures of the day, or following two or more hours shutdown, must be made at a MEDIUM POWER level rather than at voltages or currents near maximum ratings. A medium power exposure will test the system for normal function with a minimum risk of damaging the tube or transformer in the event of a component failure. The following technic may be used with due regard to radiation protection of all personnel:

Overtable:
- 18 exposures, 1 exp/sec
- large fs
- 80 kVp
- 200 mA
- 32 mAs
- 160 ms exp. time

Undertable:
- 18 expoisures, 1 exp/s
- large fs
- 60 kVp
- 250 mA
- 40 mAs
- 160 ms exp. time

NOTE: For maximum tube filament life, do not leave a high mA station selected for extended periods of time.

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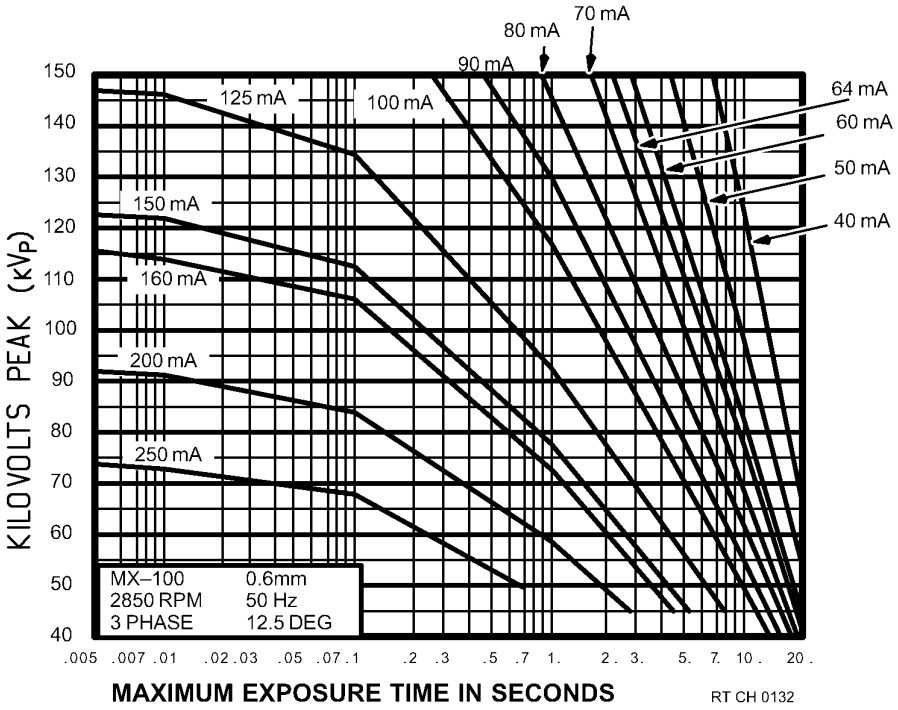
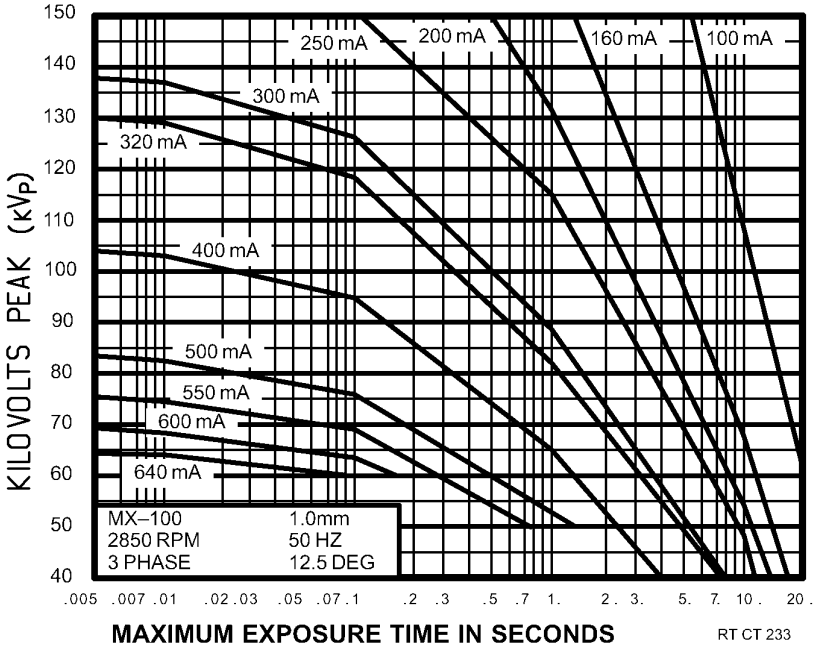
8-2 12.5° (218 mRad) 3ø, Low Speed, 50 Hz, 2850 rpm

ILLUSTRATION A-5
0.6, 1.0 MM





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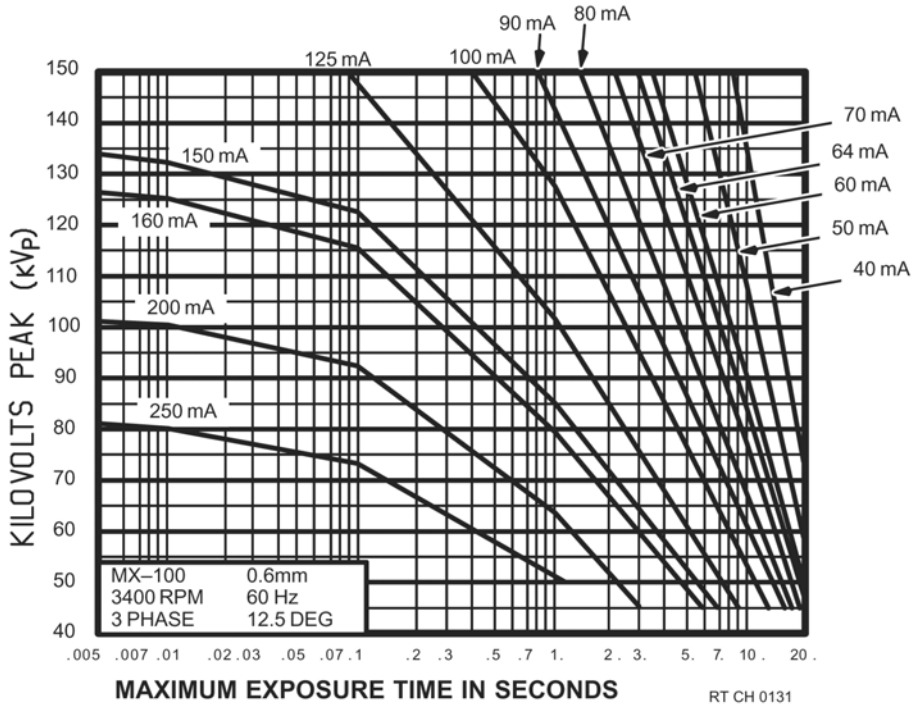
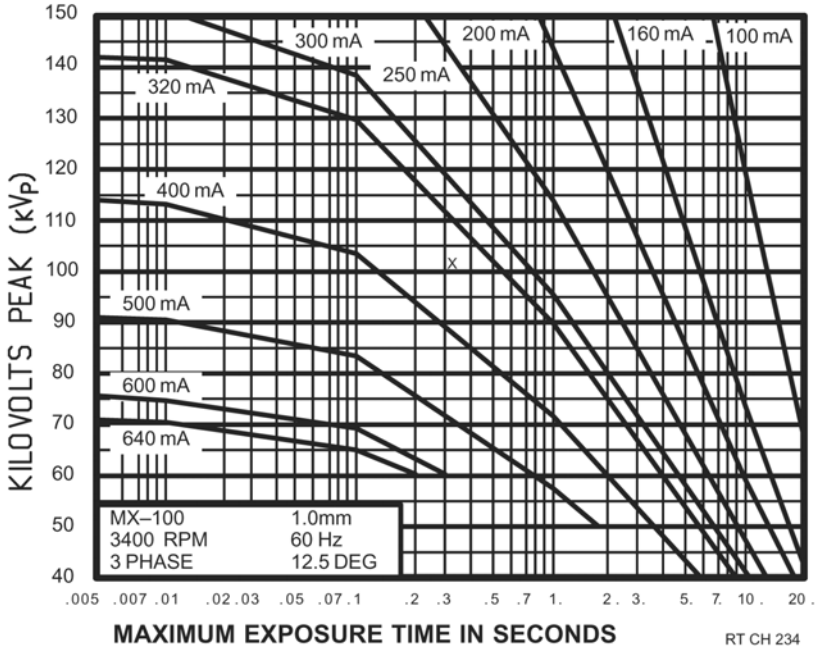
8-3 12.5° (218 mRad) 3ø, Low Speed, 60 Hz, 3400 rpm

ILLUSTRATION A-6
0.6, 1.0 MM





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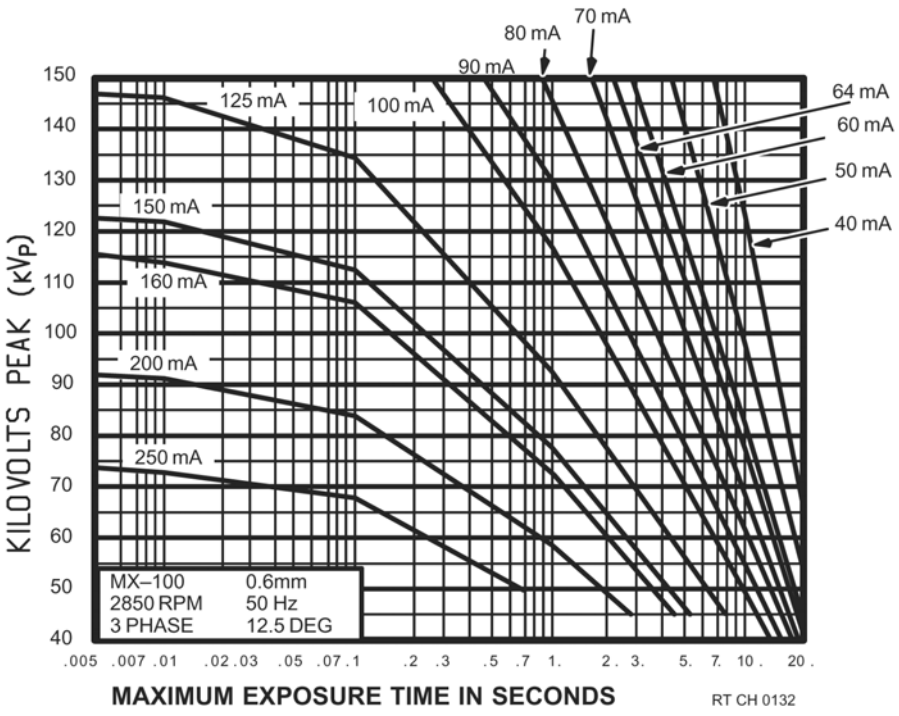
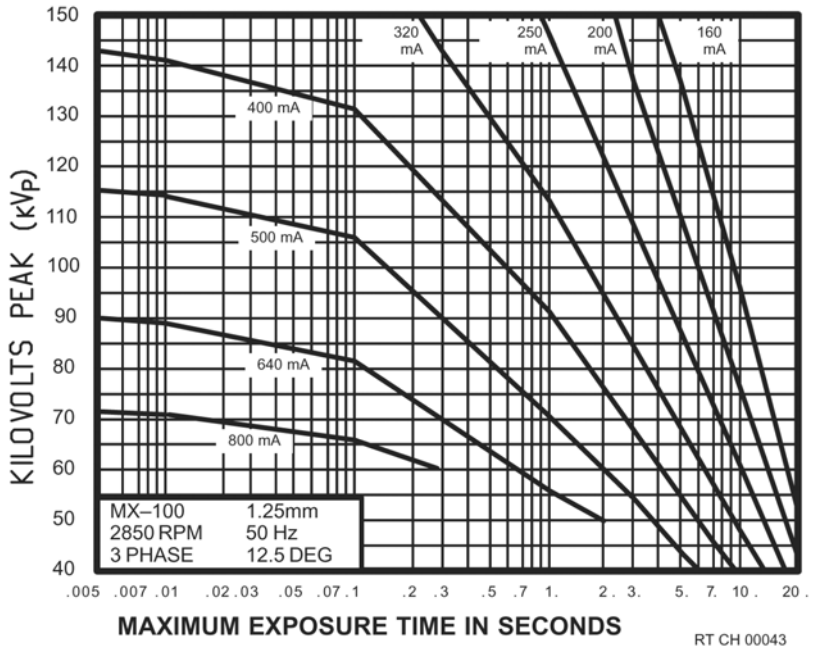
8-4 12.5° (218 mRad) 3ø, Low Speed, 50 Hz, 2850 rpm

ILLUSTRATION A-7
0.6, 1.25 MM





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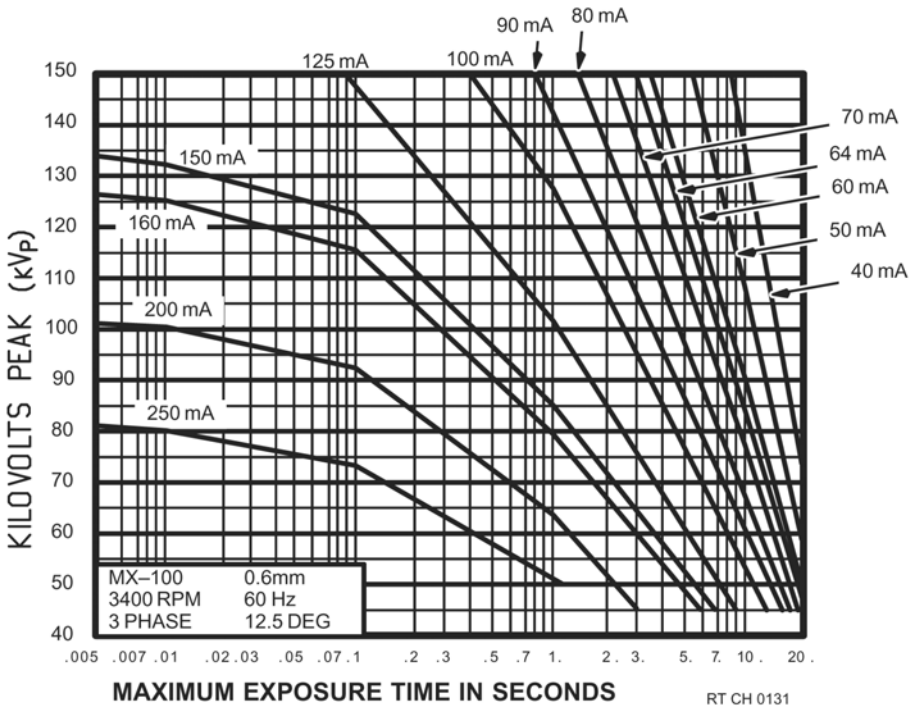
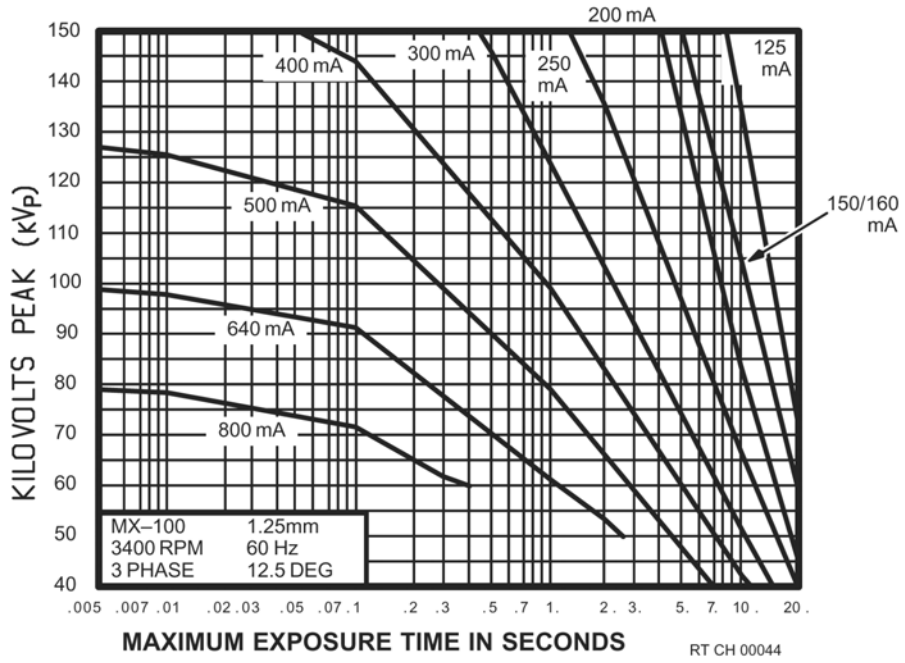
8-5 12.5° (218 mRad) 3ø, Low Speed, 60 Hz, 3400 rpm

ILLUSTRATION A-8
0.6, 1.25 MM





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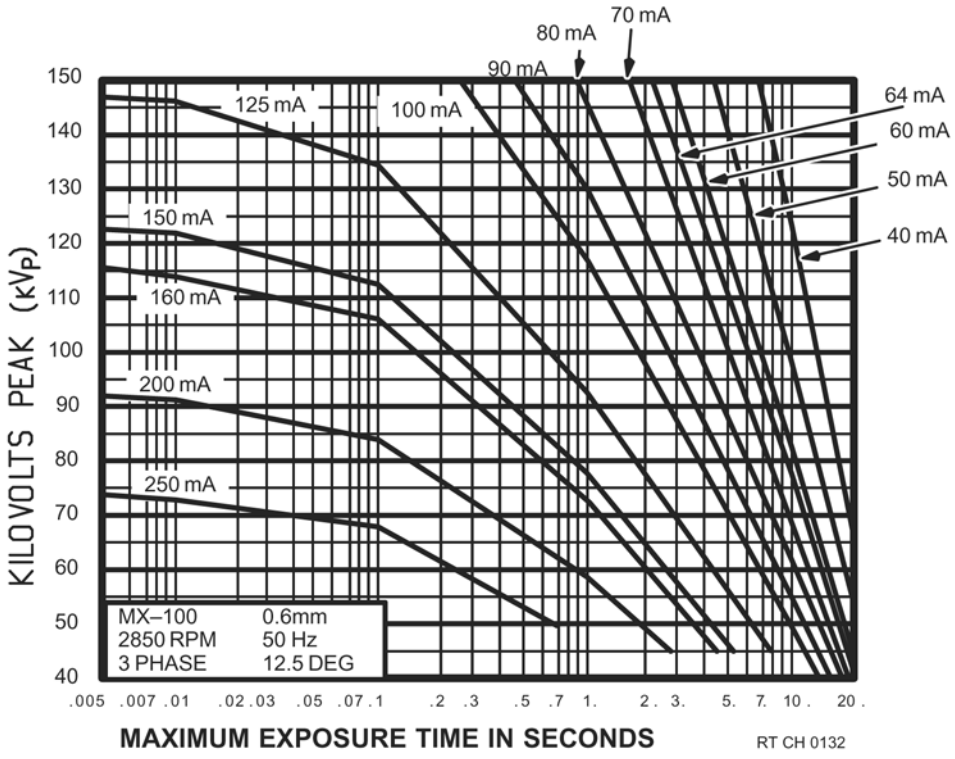
8-6 12.5° (218 mRad) 3ø, Low Speed, 50 Hz, 2850 rpm

ILLUSTRATION A-9
0.6, 1.5 MM



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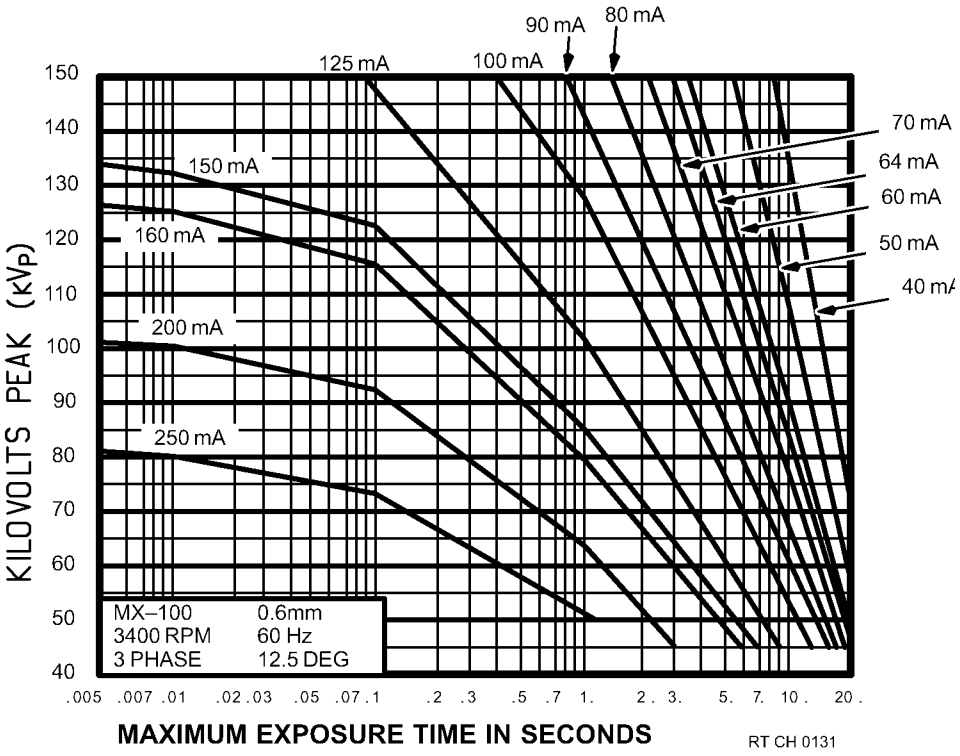
8-7 12.5° (218 mRad) 3ø, Low Speed, 60 Hz, 3400 rpm

ILLUSTRATION A-10
0.6, 1.5 MM 12.5°



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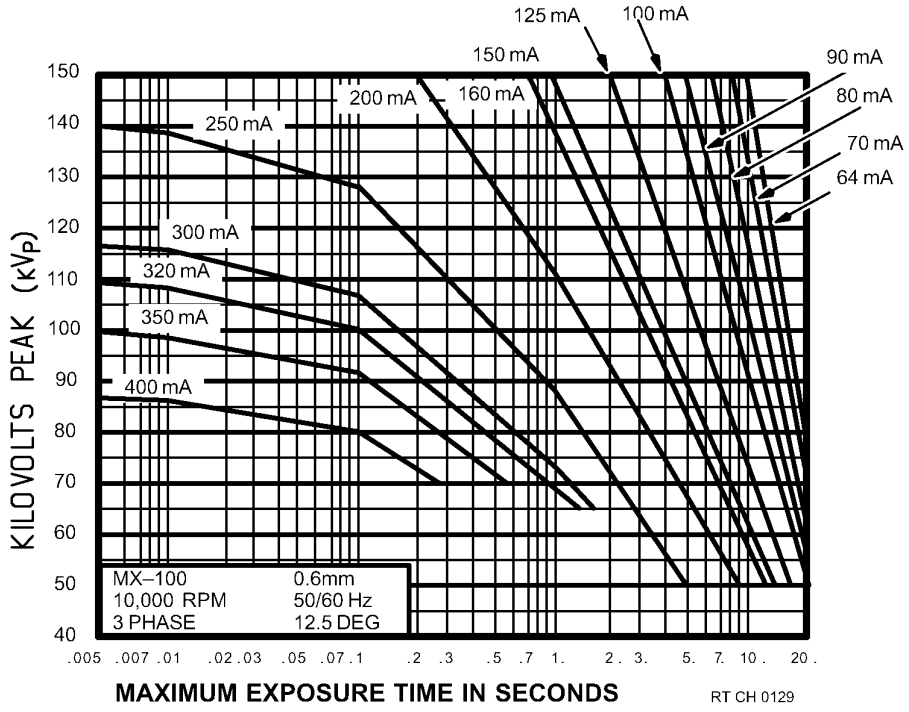
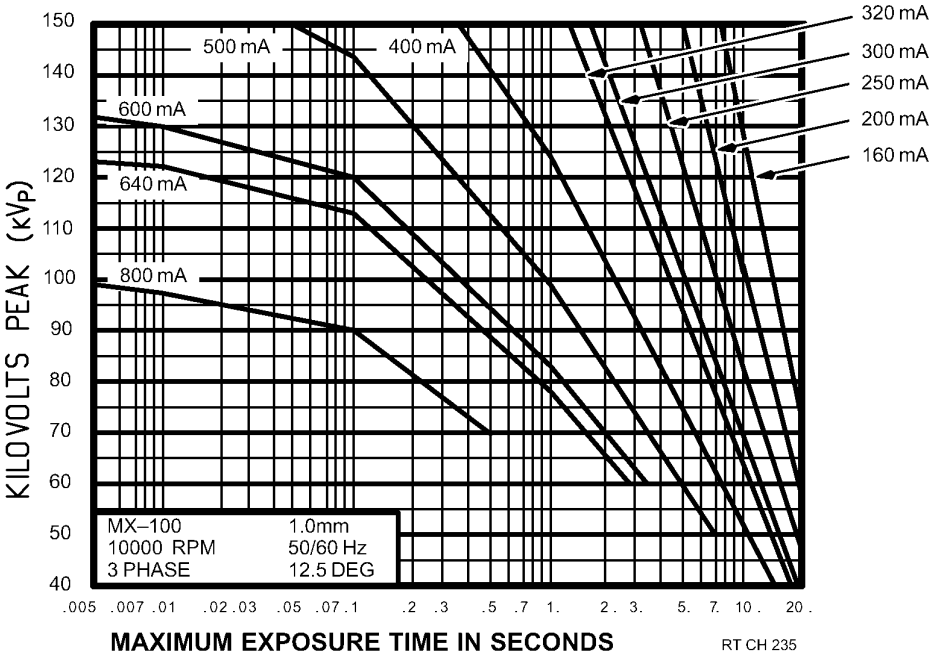
8-8 12.5° (218 mRad) 3ø, HIGH SPEED, 50/60 Hz, 10,000 rpm

ILLUSTRATION A-11
0.6, 1.0 MM





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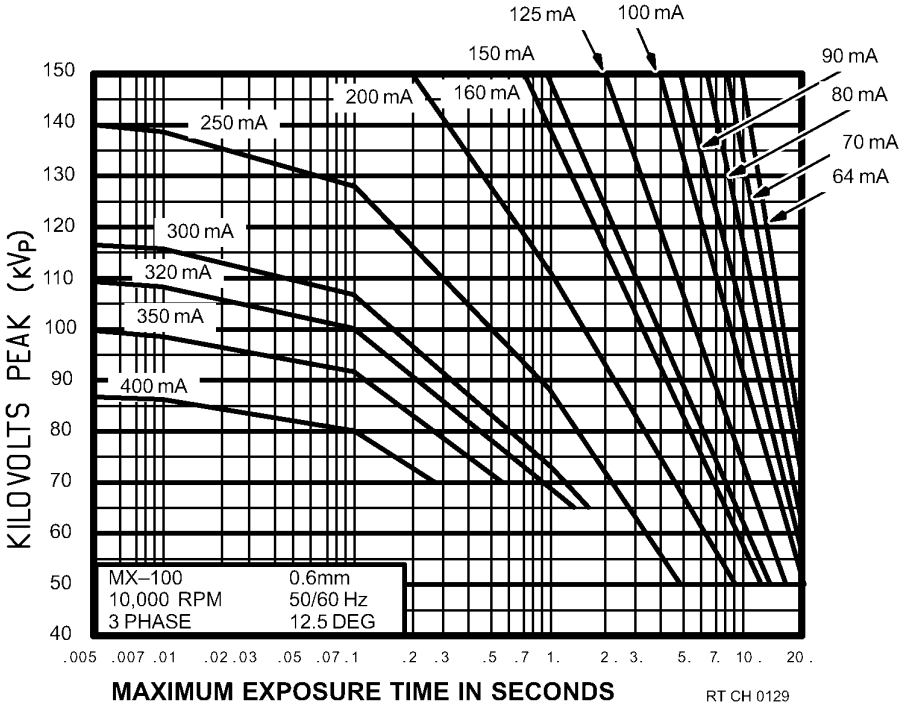
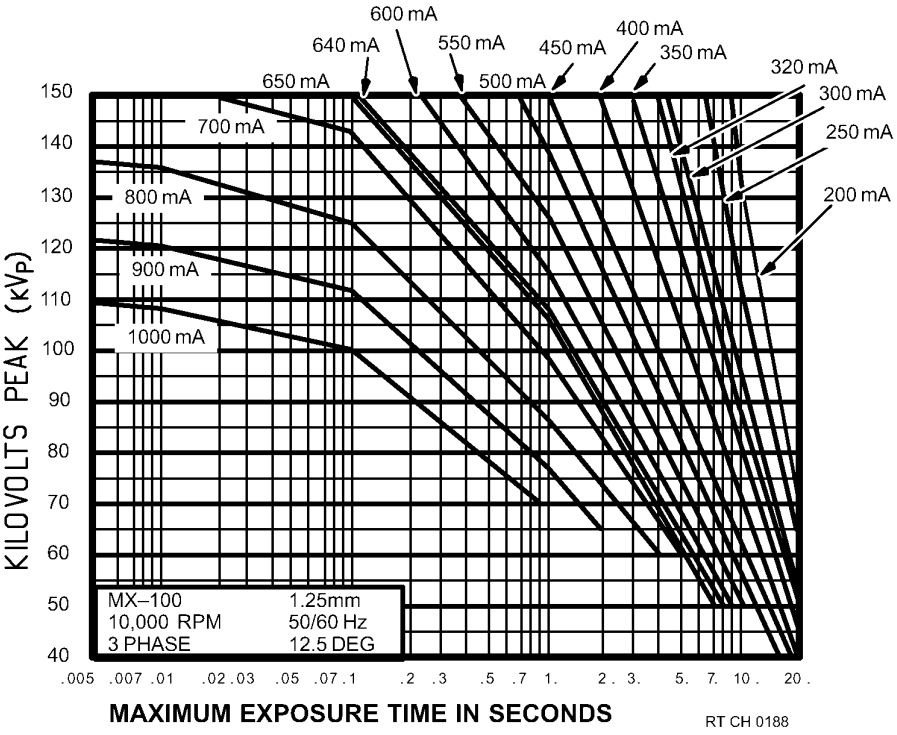
8-9 12.5° (218 mRad) 3ø, HIGH SPEED, 50/60 Hz, 10,000 rpm

ILLUSTRATION A-12
0.6, 1.25 MM





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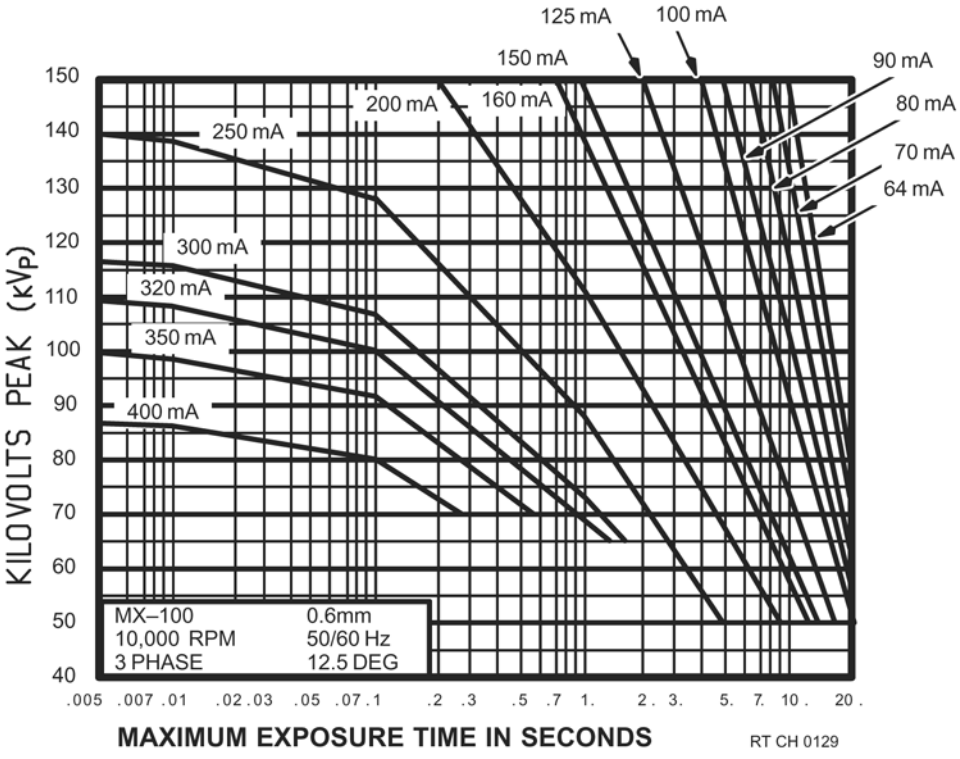
8-10 12.5° (218 mRad) 3ø, HIGH SPEED, 50/60 Hz, 10,000 rpm

ILLUSTRATION A-13
0.6, 1.5 MM



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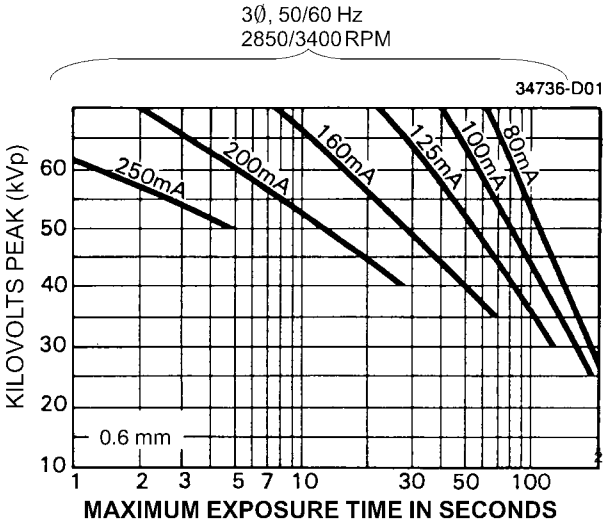
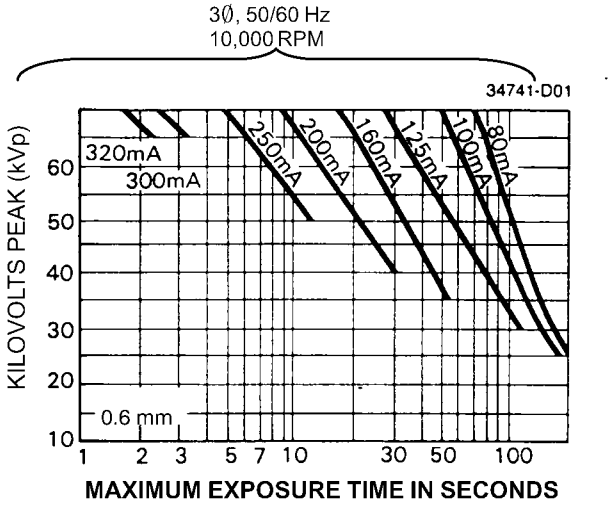
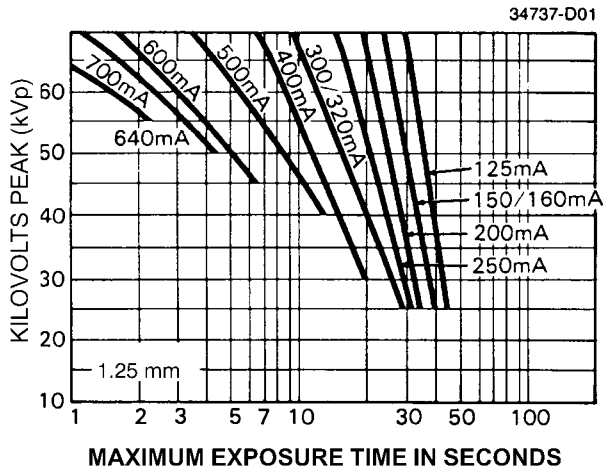
SECTION 9
MAMMOGRAPHY RATINGS

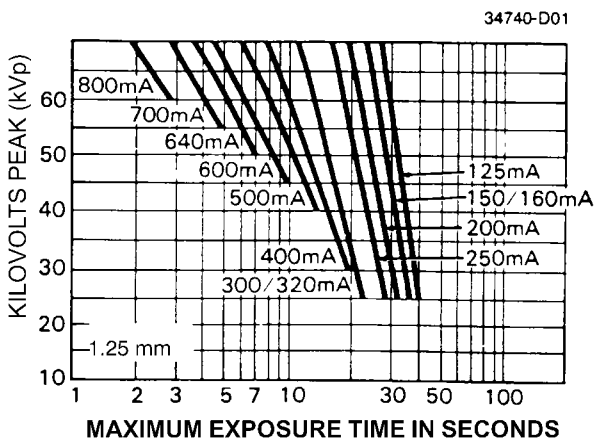
9-1 12.5° (218 mRad) 3ø, 50/60 Hz, 2850/3400 RPM

ILLUSTRATION A-14
0.6, 1.25, 1.5 mm









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SECTION 10
RAPID FILM SEQUENCE RATINGS

10-1 0.6, 1.0, 1.25 12.5_ (218 mRad) 1 Phase, 10,000 rpm, 50/60 Hz

Rapid sequence rating charts are used because of severe demands on the radiographic tube. In contrast to normal radiography, where cooling is occuring between exposures, serial radiography does not allow significant cooling of the focal spot track between exposures. Therefore, tube ratings for serial radiography must be determined from this chart.

Three variables are considered: % Duty Cycle, Series Duration, kVp x mA.

$$\%\ \text{DUTY CYCLE} = \text{EXPOSURE TIME*} \times \text{MAXIMUM FRAME RATE/SERIES} \times 100$$

$$\text{SERIES DURATION} = \frac{\text{TOTAL NUMBER EXPOSURES IN SERIES}}{\text{MAXIMUM FRAME RATE IN SERIES}}$$

Knowing any two, the third can be found from the rapid sequence chart.

EXAMPLE:
– series wanted: 4 film/sec for 3 sec =20 exp.
1 film/sec for 8 sec

– technique** 80 kVp, 250mA, 0.05 sec.

% duty cycle = 0.05 x 4 x 100 = 20% (use highest frame rate)
(duty cycle can be found on following chart)

$$\text{equiv. series duration} = \frac{\text{20 exp. total}}{\text{4 films/sec}} = 5 \text{ sec.}$$

kVp x mA = 800 x 250 = 20,000

These factors can be transferred to the rating chart that corresponds to the focal spot size selected. For the example technique we will use the 0.6 mm 12.5° (218 mRad) chart.

Enter the chart at 20,000 for 5 seconds. The intersection of these factors on the chart is 25% duty cycle, which is well beyond the 20% duty cycle calculated here. Therefore, this exposure series is safely within the rating of this focal spot.

If the % duty cycle calculated according to the formula above is greater than the % duty cycle read off the chart, then the technique should not be performed until one of the factors is reduced – maximum frame rate, total number of exposures, mA or kVp.

* For phototimed exposures such as photospots this represents the setting of the backup time on the radiographic timer.

** Must not exceed values permitted by Radiographic Rating Chart.

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TABLE A-2
DUTY CYCLE CHART

Exposure Time	FILM FRAME RATE			
Seconds	**2/sec.**	**4/sec.**	**6/sec.**	**8/sec.**
.005	1.0%	2.0%	3.0%	4.0%
.0064	1.28%	2.56%	3.84%	5.12%
.008	1.6%	3.2%	4.8%	6.4%
.010	2.0%	4.0%	6.0%	8.0%
.0125	2.5%	5.0%	7.5%	10.0%
.016	3.2%	6.4%	9.6%	12.8%
.020	4.0%	8.0%	12.0%	16.0%
.025	5.0%	10.0%	15.0%	20.0%
.032	6.4%	12.8%	19.2%	25.6%
.040	8.0%	16.0%	24.0%	32.0%
.050	10.0%	20.0%	30.0%	40.0%
.064	12.8%	25.6%	38.4%	51.2%
.080	16.0%	32.0%	48.0%	
.10	20.0%	40.0%	60.0%	
.125	25.0%	50.0%		
.16	32.0%	64.0%		

MINIMUM COOLING INTERVAL BETWEEN SERIES	
kVp x mA x DUTY CYCLE x SERIES DURATION IN SECS.	**COOLING TIME MINUTES**
10,000	1.0
20,000	2.0
35,000	3.0
60,000	4.0
130,000	5.0

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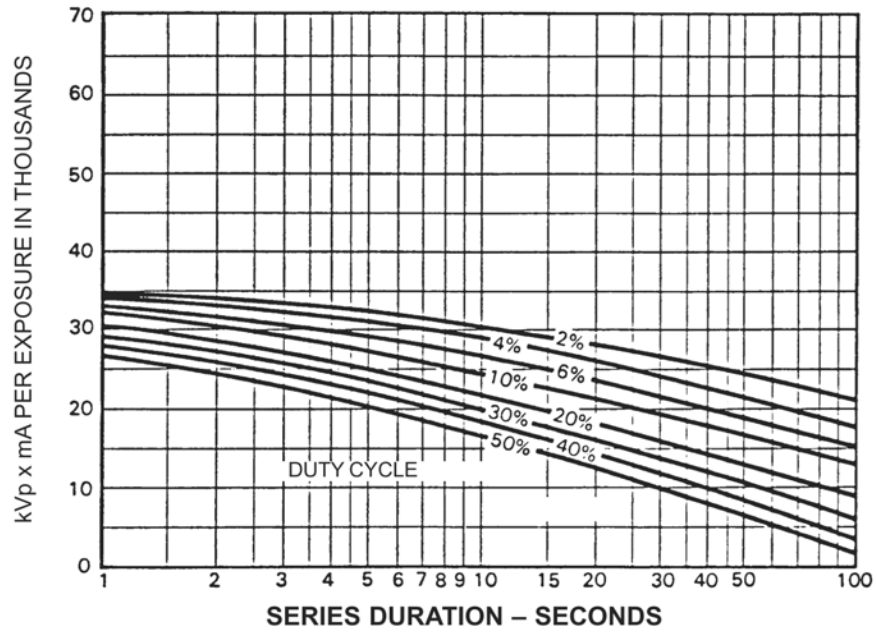
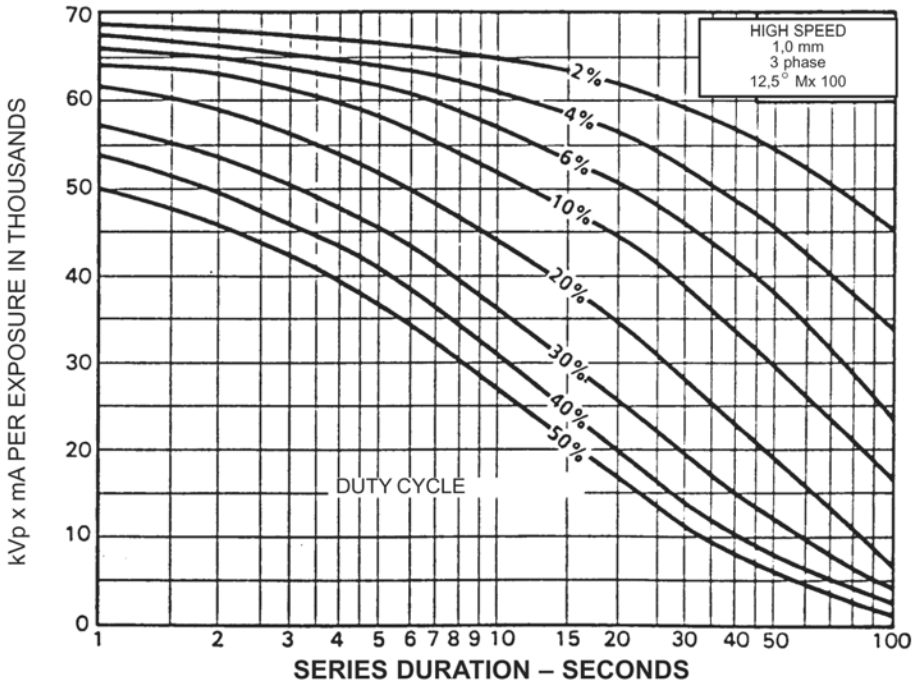
10-2 12.5° (218 mRad) 3 Phase, 10,000 rpm, 50/60 Hz

ILLUSTRATION A-15
0.6 , 1.0 MM

0.6 mm



1.0 mm



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10-3 3Ø , KILOWATT RATINGS 12.5° (218 mRad)

TABLE A-3
FOCAL SPOT SINGLE LOAD RATING 0.6 MM

EXPOSURE TIME (S)	POWER (KW)
0.01	34.7
0.1	32
1	22.1
10	9

ILLUSTRATION A-16
0.6 MM

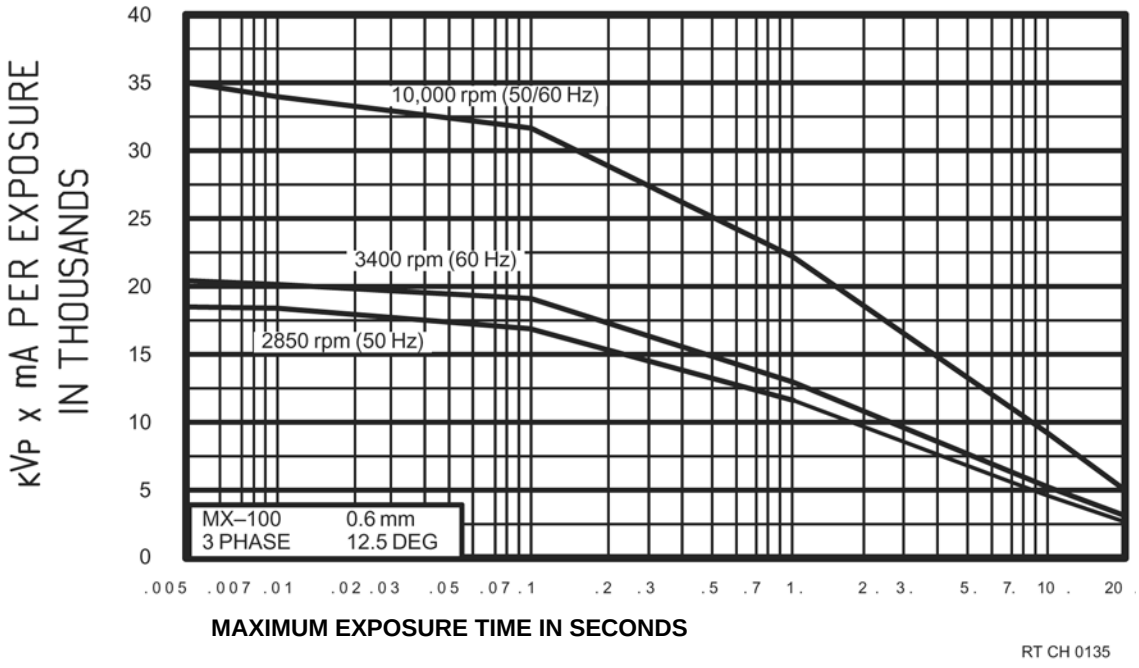

TABLE A-4
FOCAL SPOT SINGLE LOAD RATING 1.0 MM

EXPOSURE TIME (S)	POWER (KW)
0.01	78
0.1	72
1	49.7
10	20.4

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ILLUSTRATION A-17
1.0MM

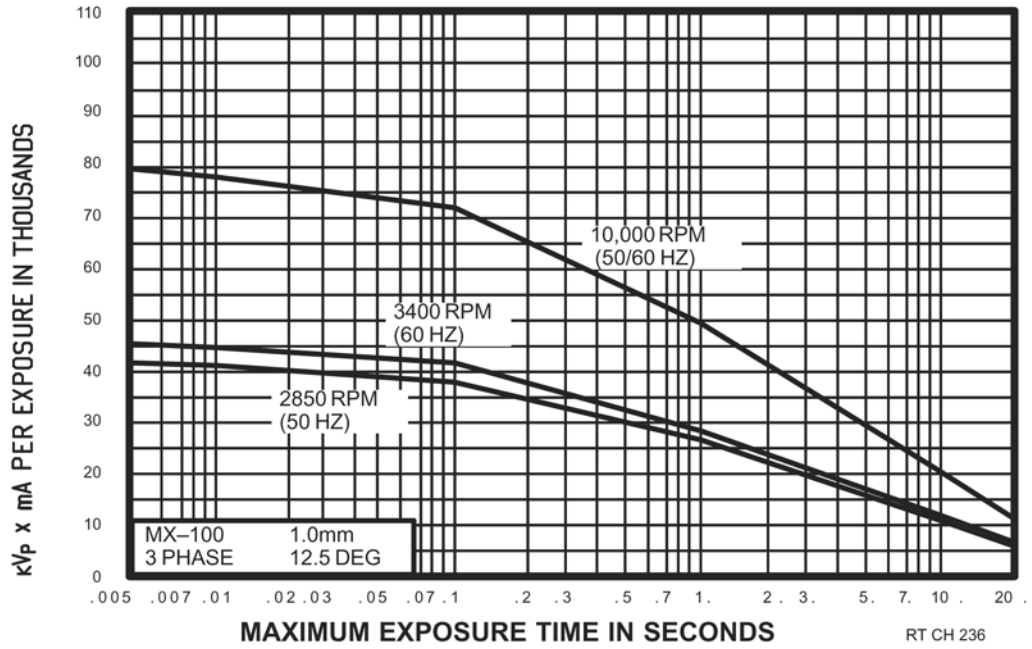

TABLE A-5
FOCAL SPOT SINGLE LOAD RATING 1.25 MM

EXPOSURE TIME (S)	POWER (KW)
0.01	108.3
0.1	100
1	69
10	28.3

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ILLUSTRATION A-18
1.25 MM

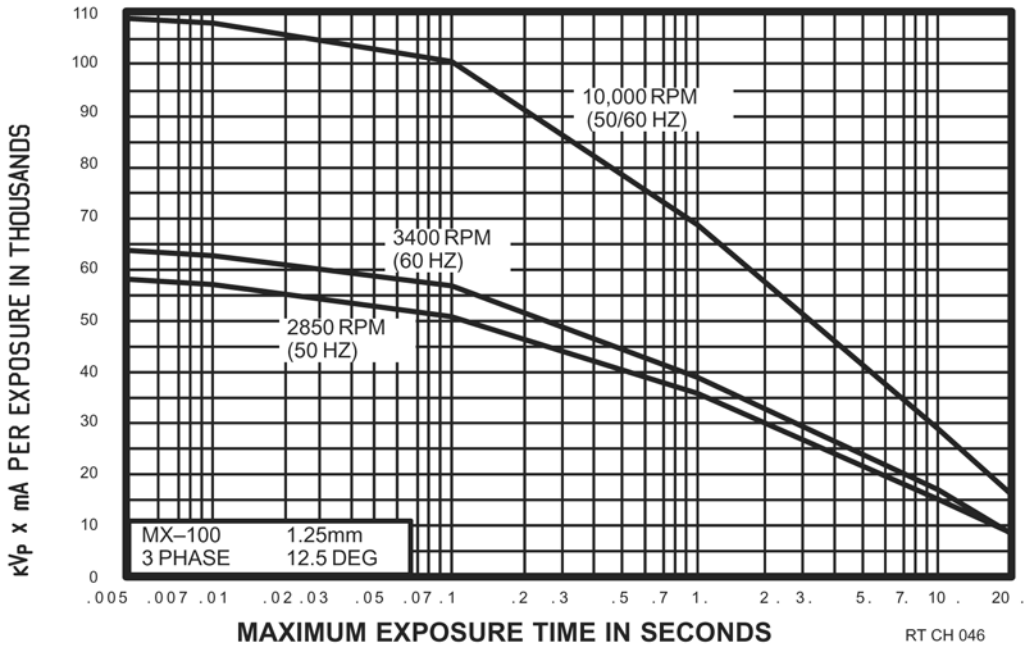

TABLE A-6
MAXIRAY® 100 TUBE FILAMENT RATINGS
12.5° (218 MRAD) TARGET

Filament (mm)	Ampères	Volts
0.6	3.4 – 5.5	2.0 – 9.0
1.0	3.4 – 6.5	2.0 – 11.0
1.25	4.3 – 6.5	4.0 – 15.0

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APPENDIX B
PLANNED MAINTENANCE

SECTION 1
TABLE PM

1-1 Periodic Maintenance

In order to assure continued safe performance of this x–ray equipment, a periodic maintenance program must be established. It is the owner's responsibility to supply or arrange for this service.

1-2 Qualified Service

Safe equipment performance also requires the use of service personnel specially trained on the medical x–ray apparatus. GE Medical Systems, and its associates, maintain a world–wide organization of stations from which one may obtain skilled x–ray service. If desired, arrangements can usually be made to furnish periodic and/ or emergency service on a contract basis. A GE Medical Systems representative will be glad to discuss this plan.

A semi–annual inspection of all counterweight cables must be made to detect the possible need for replacement. In the usual case cables should be replaced every 4 years. Although the cables are of high quality aircraft type having a factor of safety, they will not last indefinitely. Frequent inspections by qualified personnel are a "must' because of the many variations in equipment usage. These variations include number of operations, total weight load (varies with options), manner and type of operation, and amount of abrasive matter (dust) picked up by the cables.

Power driven systems must be checked at least annually for condition of components such as gears, sprockets, cables, chains, clutches mechanical stops, limit switches and brakes.

1-3 User Service and Maintenance

GE Medical Systems x–ray equipment contains operating safeguards to ensure maximum safety. Before calling for service, be certain proper operating procedures are being used.

This equipment should be cleaned frequently, particularly if corroding chemicals are present. Use a cloth slightly moistened in warm, soapy water (use mild soap) to clean the trim, table top and operator's controls. Wipe with a cloth slightly moistened in clean water. Do not use cleaners or solvents of any kind as they may dull the finish or blur the lettering.

Only trained and qualified service personnel should be permitted access to the internal parts of the equipment. Be sure that the room disconnect is turned OFF before opening access doors or removing enclosure panels.

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Once a month inspect patient safety and support devices for signs of excessive wear, improper adjustment, or other indications that adjustment, repair, or replacement is required. In case of doubt about condition of this equipment, contact a GE Service representative.

Once a month, external parts and exposed tracks, on which rollers move, should be wiped to remove any foreign material that may have accumulated. If the tracks are wiped with a rag slightly moistened in oil, sufficient lubrication will be provided to insure smooth operation. Personal caution should be used when removing any accumulating foreign material.

Personal caution should be used when removing any accumulating foreign material.

SECTION 2
IMAGE QUALITY TESTING

This section contains the instructions on how to perform the Quality Assurance Process (QAP).

QAP is a series of tests that may be performed to quantify system image quality. This process is semi–automatic, requiring the operator to position special targets (phantoms) in the image chain, to adjust the distance of the X–Ray tube to the table, and to acquire the images. The acquired images are then analyzed, test results are stored, and system image quality status is displayed. Detailed test instructions are displayed on the operator console when the operator selects the Image Quality icon on the Service User Interface.

Two phantoms are used during QAP testing: a flat field phantom (12 x 12 x 1/32_ Cu sheet) and a QAP phantom. The flat field phantom will lay flat on the table during the flat field image acquisitions. The QAP phantom will be held in place beneath the image intensifier using a special phantom holder (replacing the cone holder) during the QAP image acquisitions. Again, detailed instructions are provided in the Service User Interface screen once the Image Quality icon is selected.

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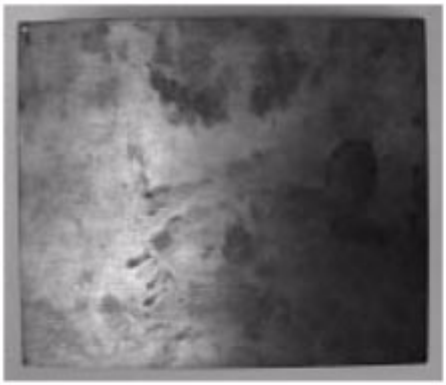
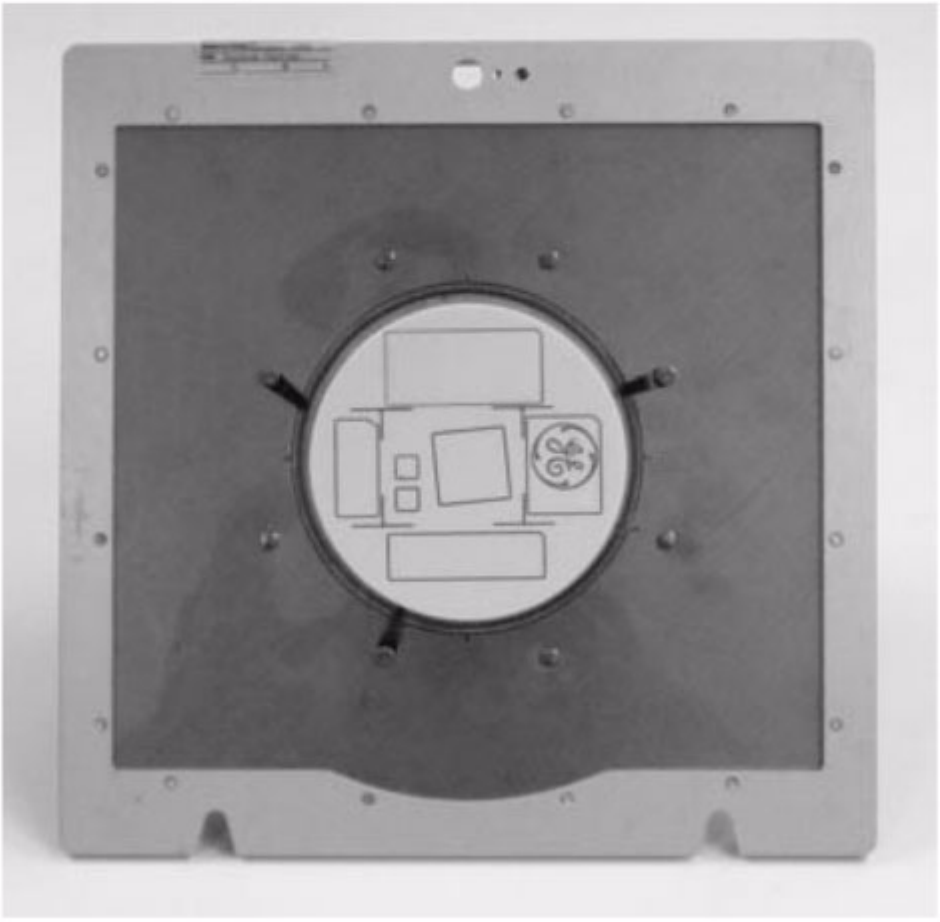
ILLUSTRATION B-1
FLAT FIELD PHANTOM AND QAP PHANTOM

FLAT FIELD PHANTOM



QAP PHANTOM



The flat field phantom is used to check:

- Fluoro Noise
- Record Noise
- Left Right Brightness Non Uniformity

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The QAP phantom is used to check:

- Edge Sharpness/Resolution
- Image Resolution Uniformity
- Dynamic Range Level Accuracy
- Signal Contrast
- Contrast to Noise Ratio (CNR)

At the completion of QAP, system image quality status will be reported to the operator and will display one of the following messages:

- **QAP has completed successfully. Image Quality is optimal.**
- **QAP has failed. Image Quality is not optimal. Call GE Service.**
- **QAP could not be executed. Please run application again or call GE Service.**

A successful status indicates that all the image quality parameter values are within the system specification limits. A failed status indicates that one or more of the image quality parameter values fall outside the system specification limits. If a system fails QAP, operator is advised to call GE Service to make the proper system adjustments or calibrations to regain optimal system image quality. Periodic QAP tests are recommended to assure optimal system operation.

2-1 How to perform the Quality Assurance Process

1. Close all clinical applications from the IUI console.
2. Select the **Utilities** tab located across the top of the screen on the IUI console.
3. Select the **Service** Button from the right menu of the Utilities screen.
4. Select the **Image Quality** Button located across the top of the Service screen of the IUI Console. See ILLUSTRATION B-2.

ILLUSTRATION B-2
IMAGE QUALITY BUTTON

5. Select **Image Quality > Quality Control Tools > QAP** from the left panel, shown in ILLUSTRATION B-3.

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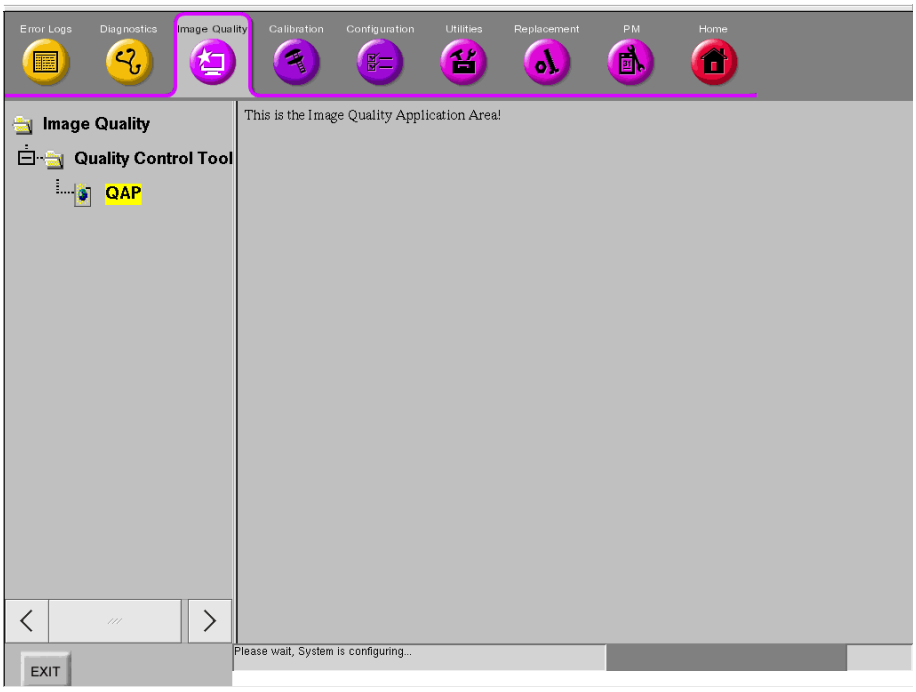
ILLUSTRATION B-3
QAP SELECTION

6. The Image Quality screen will appear.



The QAP application has 3 steps:

Step 1: Flat field, low dose (fluoroscopy) image acquisition
Step 2: Flat field, normal dose (digital record) image acquisition
Step 3: QAP Phantom, normal dose (digital record) image acquisition

NOTE: Make sure the default Horizontal and Vertical Settings are restored before starting QAP unit.

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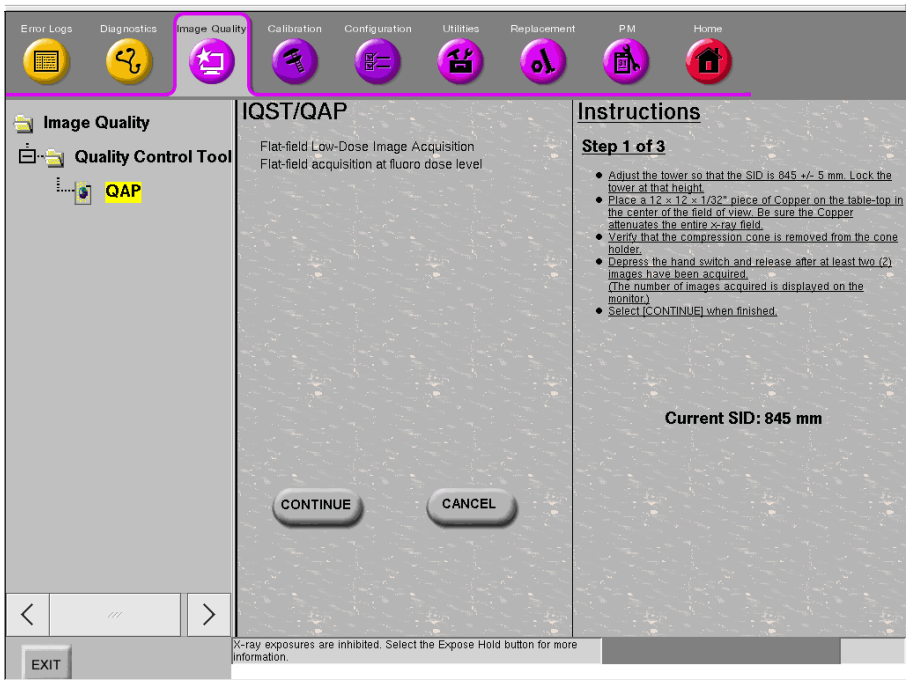
After the *"QAP"* is started, the system will take several seconds to compute system electronic noise.

Then, the screen will transition to the **Step 1 Instruction Screen** with the following instructions:


Error Logs
Diagnostics
Image Quality
Calibration
Configuration
Utilities
Replacement
PM
Home
Image Quality
Quality Control Tool
QAP
IQST/QAP
Flat-field Low-Dose Image Acquisition
Flat-field acquisition at fluoro dose level
Instructions
Step 1 of 3
Adjust the tower so that the SID is 845 +/- 5 mm. Lock the tower at that height.
Place a 12 x 12 x 1/32" piece of Copper on the table-top in the center of the field of view. Be sure the Copper attenuates the entire x-ray field.
Verify that the compression cone is removed from the cone holder.
Depress the hand switch and release after at least two (2) images have been acquired.
(The number of images acquired is displayed on the monitor.)
Select [CONTINUE] when finished.
Current SID: 845 mm
CONTINUE
CANCEL
EXIT
X-ray exposures are inhibited. Select the Expose Hold button for more information.

Step 1 of 3

- Adjust the tower so the the SID is equal to the value displayed in the screen instructions, +/-5 mm. Lock the tower at that height.
- Place a 12x12x1/32 inch copper sheet on the top of the table in the center of the field of view. Ensure that the copper sheet attenuates the entire X-ray field.
- Verify that the compression cone is removed from the cone holder.
- Depress the hand switch and release after at least 2 images have been acquired. (The number of images acquired is displayed on the image monitor.)
- Select the "CONTINUE" button when finished.

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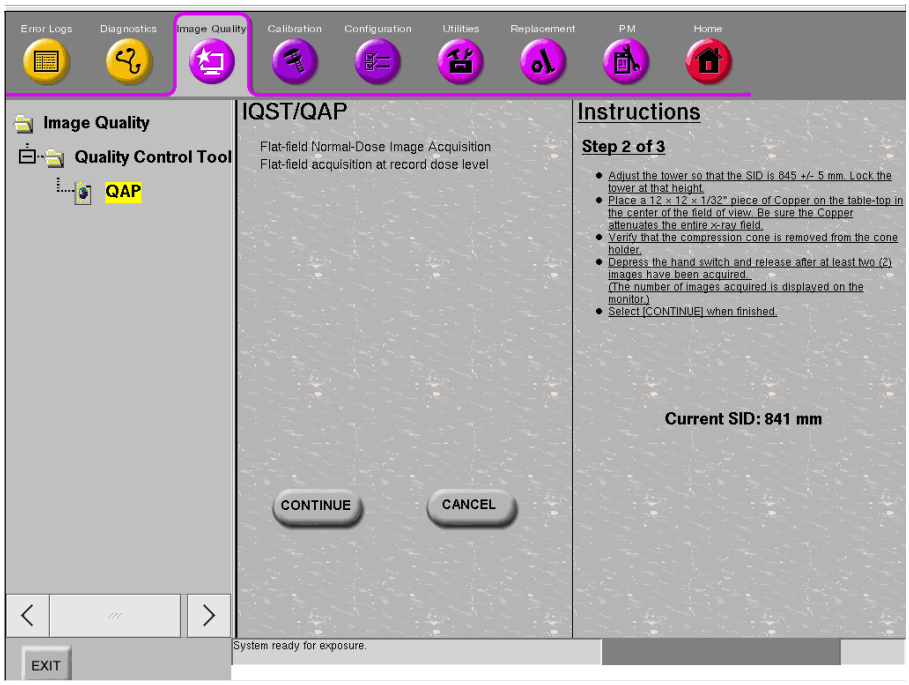
7. When the “CONTINUE” button is pressed, the screen will transition to the **Step 2 Instruction Screen** with the following instructions:


Error Logs
Diagnostics
Image Quality
Calibration
Configuration
Utilities
Replacement
PM
Home
Image Quality
Quality Control Tool
QAP
IQST/QAP
Flat-field Normal-Dose Image Acquisition
Flat-field acquisition at record dose level
Instructions
Step 2 of 3
Adjust the tower so that the SID is 845 +/- 5 mm. Lock the tower at that height.
Place a 12 x 12 x 1/32" piece of Copper on the table-top in the center of the field of view. Be sure the Copper attenuates the entire x-ray field.
Verify that the compression cone is removed from the cone holder.
Depress the hand switch and release after at least two (2) images have been acquired.
(The number of images acquired is displayed on the monitor.)
Select [CONTINUE] when finished.
Current SID: 841 mm
CONTINUE
CANCEL
System ready for exposure.
EXIT

Step 2 of 3

- Adjust the tower so the the SID is equal to the value displayed in the screen instructions, +/-5 mm. Lock the tower at that height.
- Place a 12x12x1/32 inch copper sheet on the top of the table in the center of the field of view. Ensure that the copper sheet attenuates the entire X-ray field.
- Depress the hand switch and release after at least 2 images have been acquired. (The number of images acquired is displayed on the image monitor.)
- Select the "CONTINUE" button when finished.

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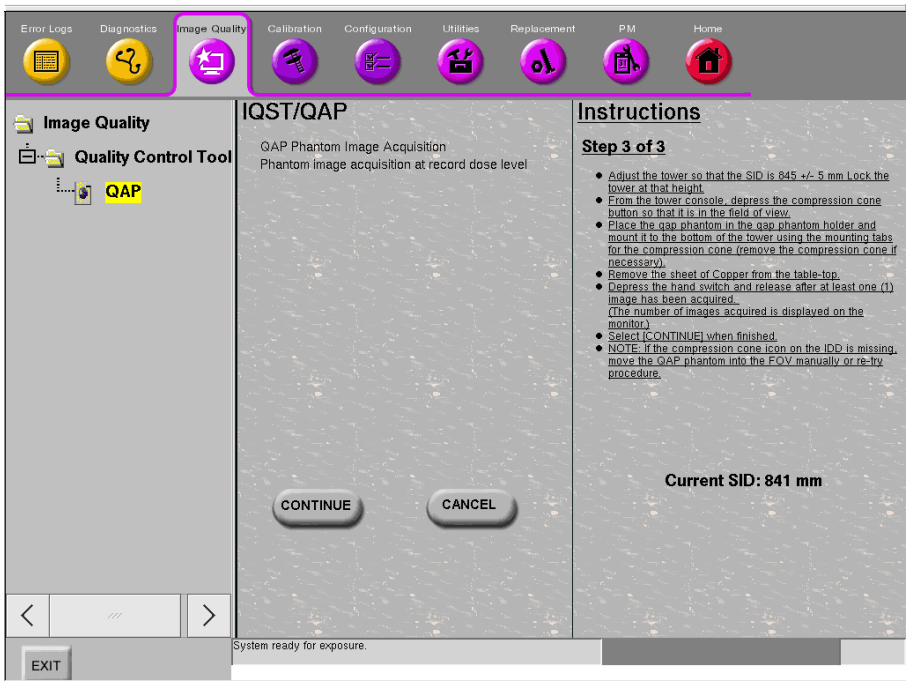
8. When the “CONTINUE” button is pressed, the screen will transition to the **Step 3 Instruction Screen** with the following instructions:


Error Logs
Diagnostics
Image Quality
Calibration
Configuration
Utilities
Replacement
PM
Home
Image Quality
Quality Control Tool
QAP
IQST/QAP
QAP Phantom Image Acquisition
Phantom image acquisition at record dose level
CONTINUE
CANCEL
Instructions
Step 3 of 3
Adjust the tower so that the SID is 845 +/- 5 mm Lock the tower at that height.
From the tower console, depress the compression cone button so that it is in the field of view.
Place the qap phantom in the qap phantom holder and mount it to the bottom of the tower using the mounting tabs for the compression cone (remove the compression cone if necessary).
Remove the sheet of Copper from the table-top.
Depress the hand switch and release after at least one (1) image has been acquired.
(The number of images acquired is displayed on the monitor.)
Select [CONTINUE] when finished.
NOTE: If the compression cone icon on the IDD is missing, move the QAP phantom into the FOV manually or re-try procedure.
Current SID: 841 mm
System ready for exposure.
EXIT

Step 3 of 3

- Adjust the tower so the the SID is equal to the value displayed in the screen instructions, +/-5 mm. Lock the tower at that height.
- From the tower console, depress the compression cone button so that the cone holder moves into the field of view.
- (NOTE: If the compression cone icon on the IDD is missing, move the QAP phantom into the field of view manually or re-try procedure.)
- Place the QAP phantom in the phantom holder and mount it to the bottom of the tower using the mounting tabs for the compression cone. (Remove the compression cone if the cone is currently mounted.)
- Remove the copper sheet used in Step 1 and 2 from the table
- Depress the hand switch and release after at least 1 image has been acquired. (The number of images acquired is displayed on the display monitor.)
- Select “CONTINUE” when finished.

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9. When the "CONTINUE" button is pressed, the application will proceed to compute the image quality parameters and compared them to their corresponding specification limits.

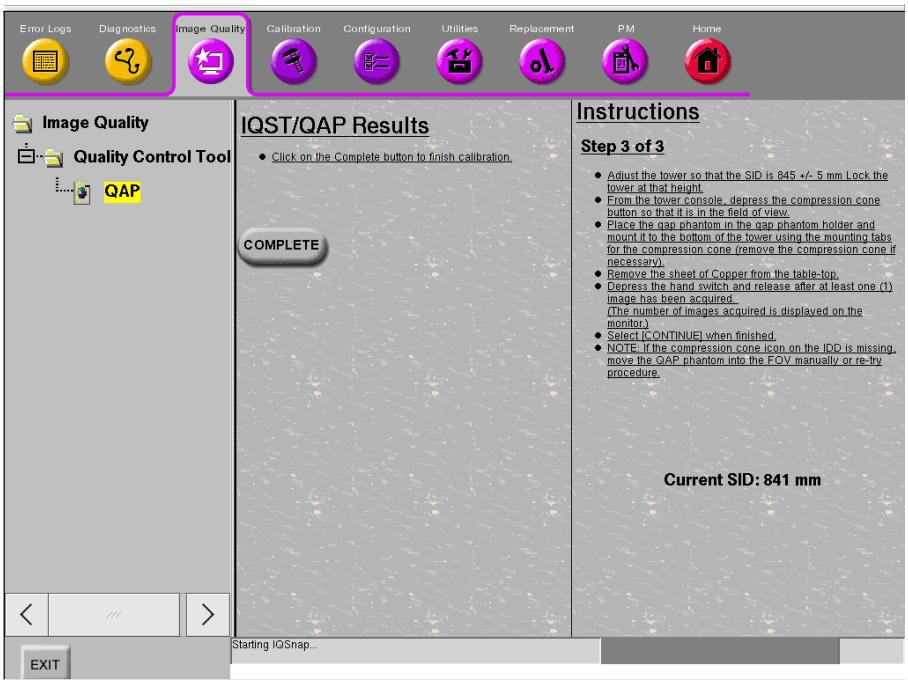
   After analysis is completed, the results will be summarized by one of the following two messages on the Analysis Screen.

   Success message when image quality is optimal:
   "Quality Assurance Program has been completed successfully - Image quality is optimal"

   Failure message when image quality is not optimal:
   "Quality Assurance has failed. - Image quality is not optimal. Please call GE Service"

   If a failure message is displayed, please call GE Service.

10. Select the **Complete** button to finish the QAP process.


Error Logs
Diagnostics
Image Quality
Calibration
Configuration
Utilities
Replacement
PM
Home
Image Quality
Quality Control Tool
QAP
IQST/QAP Results
Click on the Complete button to finish calibration.
COMPLETE
Instructions
Step 3 of 3
Adjust the tower so that the SID is 845 +/- 5 mm Lock the tower at that height.
From the tower console, depress the compression cone button so that it is in the field of view.
Place the qap phantom in the qap phantom holder and mount it to the bottom of the tower using the mounting tabs for the compression cone (remove the compression cone if necessary).
Remove the sheet of Copper from the table-top.
Depress the hand switch and release after at least one (1) image has been acquired.
(The number of images acquired is displayed on the monitor.)
Select [CONTINUE] when finished.
NOTE: If the compression cone icon on the IDD is missing, move the QAP phantom into the FOV manually or re-try procedure.
Current SID: 841 mm
Starting IQSnap...
EXIT

11. Exit the Service Screen by selecting the Exit button at the bottom left corner of the screen.

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SECTION 3
GENERAL

In order to assure continued safe performance of this x–ray equipment, a periodic maintenance program must be established. Functional Checks will not indicate that this x–ray system is performing to specifications. Only regular periodic maintenance can locate potential problems. It is the owner's responsibility to arrange for this service.

Inspection intervals are based on average daily use of one eight hour shift. More frequent inspection is appropriate where equipment use is above average.

Aside from routine maintenance, any abnormal noise, vibration or unusual performance should be reported immediately to a GE Medical Systems representative. Before calling for service, however, be sure the equipment is being operated in accordance with the foregoing instructions.

FAILURE TO PERFORM THE PERIODIC INSPECTION AND MAINTENANCE COULD ALLOW DETERIORATING CONDITIONS TO DEVELOP WITHOUT BEING DETECTED. THIS DETERIORATION COULD RESULT IN EQUIPMENT FAILURES WHICH COULD CAUSE SERIOUS INJURY OR EQUIPMENT DAMAGE.

ELECTRIC SHOCK HAZARD! THE OTS SUSPENSION CONTAINS NO USER SERVICEABLE COMPONENTS. DO NOT ATTEMPT TO DISABLE THESE COMPONENTS OR REMOVE ANY TRIM COVERS. REFER SERVICE TO QUALIFIED PERSONNEL.

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3-1 Periodic Maintenance Schedule

MAINTENANCE ITEM	FREQUENCY (MONTHS)
SAFETY	
Check all counterweight cables	6 months
Check mounting bolts	6 months
Check ground leakage	6 months
Check loose or damaged hardware and accessories	6 months
FUNCTIONAL	
Inspect components	6 months
Vacuum dust filters in cabinets, console, system control, & digital	6 months
Clean and lubricate	6 months
Check system operation	6 months
Check drives and locks	6 months
Check Indicators and interlocks	6 months
PERFORMANCE	
Calibrate conversion factor compensation	6 months
mR/mAs Calibration	6 months
Check half value layer	6 months
Evaluate image quality (QAP)	6 months
Verify collimator response	6 months
Check photo timer (AEC)	6 months
Check protection circuits	6 months
Review previous performance	6 months

SECTION 4
SERVICE

4-1 User Cleaning and Disinfecting

This equipment should be cleaned frequently, particularly if corroding chemicals are present. Use a cloth moistened in warm soapy water (use mild soap) to clean the trim and nameplate of the Operator's Controls. Wipe with a cloth moistened in clean water.

Do not use cleaners or solvents of any kind as they may dull the finish or blur the lettering. Polish with a pure liquid or paste wax. Other surfaces of the equipment can be cleaned using a clean cloth moistened slightly with a good mild cleaner and polish acceptable for use on enamelled metal surfaces.

Before each use, equipment surfaces that contact the patient should be cleaned with an EPA registered, low–level disinfecting or sanitizing agent.

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On the console, clean the frame and the mylar surface with a lint–free cloth moistened with alcohol. DO NOT:

1. Use alkaline products.
2. Place objects on the mylar surface which are likely to cause scratches.
3. Use the console to write on.

IN THE EVENT OF EQUIPMENT CONTACTING BROKEN SKIN OR BEING USED WITH INFECTED OR IMMUNE COMPROMISED PATIENTS, THE EQUIPMENT SHOULD BE CLEANED USING FDA CLEARED AND EPA REGISTERED HIGH–LEVEL DISINFECTING AGENTS. CIDEX LIQUID CHEMICAL GERMICIDE IS RECOMMENDED FOR THIS PURPOSE.

NOTE: Be sure to follow the label instructions and pre–cautions for use, storage, and disposal of all disinfecting agents.

4-2 HHS Testing (US Only)

The United States Department of Health and Human Services (HHS) has established performance requirements for diagnostic x–ray equipment. These requirements are defined in Title 21 of the Code of Federal Regulations (21 CFR), and apply only to certain specified components identified as “certified equipment.”

The manufacturer of specified diagnostic x–ray components must certify that the components:

1. Perform as required by the HHS standard when installed, adjusted, and tested as specified in the manufacturer’s instructions to the assembler.
2. Will continue to comply when maintained in accordance with the manufacturer’s instructions.

4-3 Recycling

Packing Materials:

The materials used to pack our equipment are recyclable. They must be collected and processed in accordance with the regulations in force for the country where the machines or accessories are unpacked.

Machines or Accessories at end–of–life:

The elimination of machines and accessories must be in accordance with national regulations for waste processing. All materials and components that could pose a risk to the environment must be removed from the machines at end–of–life and accessories (examples: dry and wet cell batteries, transformer oil, etc.).

Please consult your local GEMS representative before discarding these products.

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APPENDIX C
GLOSSARY/TERMS

SECTION 1
TABLE TERMS

1-1 Operating Modes

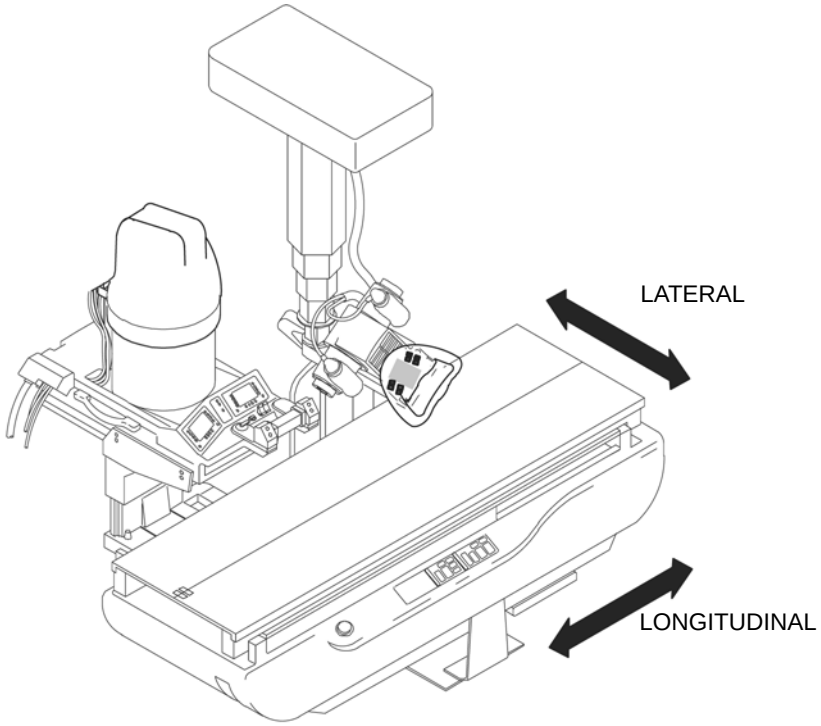
Fluoro: Diagnostic information obtained with a image intensifier/video system and displayed on a TV screen.

Spot Film: Diagnostic information recorded on a radiographic sheet of film. The radiograph may have more than one picture per film sheet.

Digital Record: Diagnostic information obtained with a image intensifier/video digitizing system and recorded on computer disk.

Table Bucky: Radiographic recording with an overhead X–Ray tube (Tube–2) and film receptor within the Precision 500D table.

ILLUSTRATION C-1
LONGITUDINAL/LATERAL



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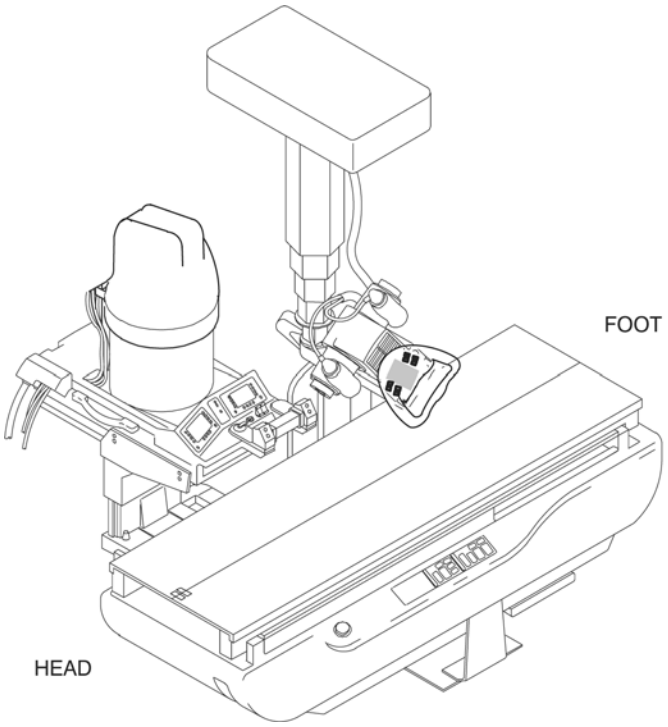
Head End: Looking at the front side of the table, the head of the patient is at the left end of the table. With reference to film, it is the side of the film closest to the head end of the table.

Foot End: Looking at the front side of the table, the feet of the patient are at the right end of the table. With reference to film, it is the side of the film closest to the foot end of the table.

ILLUSTRATION C-2
HEAD/FOOT



1-2 System Terms

SID Source-to-Image Distance
The distance, in inches or centimeters, from the X–ray tube focal spot to the X–ray receptor image plane.

SOD Source-Object Distance
The distance, in inches or centimeters, from the X–ray tube focal spot to the anatomy of interest.

Field of View (FOV) The size of the viewed image from the image intensifier. Depending on the size of the image intensifier this can be 16, 12, 9, 6, or 4.5 inches.

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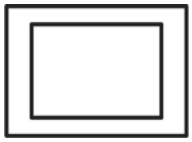
SECTION 2
DIGITAL IMAGING SYSTEM TERMS

2-1 Symbols

The following symbols are used on the system hardware.

This symbol indicates the system is rated as Type B Equipment according to IEC 601 regulations. This symbol is located on the rear panel of the electronics cabinet.



This symbol indicates a double insulated item according to IEC 601 regulations. This symbol is located on the system camera head.

This symbol indicates an electrostatic sensitive device. This symbol is located on several components of the system including the interior of the electronics cabinet. Be sure to follow proper ESD handling procedures when inspecting, installing, or servicing any component of the system. You may connect your ground strap to any point on the cabinet chassis.

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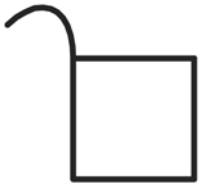
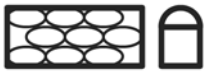


This symbol indicates the position of the lock for the front access panel of the PC cabinet. The symbol is located just above the lock, on the left edge of the front panel.

This symbol indicates the PC Reset switch for the system. This symbol and switch are located on the front panel of the electronics cabinet, below the main ON/OFF switch.



This symbol indicates the Keyboard Lock switch. This switch does not function for the system. This switch is located on the front panel of the electronics cabinet, below the PC Reset switch.

This symbol indicates the Disk Open button for the system Compact Disk Player or Optical Disk Player. This symbol is located on the front panel of the electronics cabinet, on the Disk player unit.

Protective earth (ground) – This symbol indicates a grounding location for the internal current in the system. This symbol is located inside the electronics cabinet.

This symbol indicates Caution should be used when touching hardware in this area – refer to the Technical Manual for instructions on handling the hardware. This symbol is located on the electronics cabinet, and on the Isolation Transformer.

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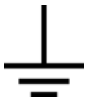
This symbol indicates the Volume control for the CD Player headset. This switch does not function for the system. This symbol is located on the front panel of the electronics cabinet, on the Compact Disk player unit.

Direct Current and alternating current.



Earth (ground) – Functional

N

Connection point for the neutral conductor on PERMANENTLY INSTALLED EQUIPMENT.

IPX1

Protected against dripping water.

Equipotentiality.

Class II Equipment.

Attention, consult ACCOMPANYING DOCUMENTS.

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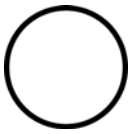
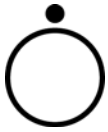


Off (power; disconnection from the mains)

On (power; connect to the mains)



“Off” (only for a part of Equipment)

“On” (only for a part of Equipment)

Type B Equipment.

Dangerous voltage

Non–ionizing radiation.

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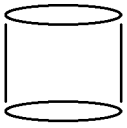
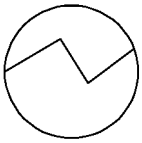


When this LED symbol is lit it indicates the Hard Disk Drive unit is active. This symbol is located on the front panel of the electronics cabinet.



When this LED symbol is lit, it indicates the power to the system is ON. This symbol is located on the front panel of the electronics cabinet.

SECTION 3
ABBREVATIONS

Abbreviation		Definition
A		Amps
AC		Alternating Current
ACR–NEMA		American College of Radiology–National Electronics Manufacturers Association
C		Celsius
CD–ROM		Compact Disk – Read Only Memory
cm		Centimeters
DICOM		Digital Image COMmunication (Protocol)
DSA		Digital Subtraction Angiography
E		Expose
F		Fahrenheit
FDA		Food & Drug Administration
fps		Frames per Second
FWD		Forward
FOV		Field of View
hPa		Hecto Pascal (unit of pressure measurement)
Hz		Hertz
II		Image Intensifier
KV		Kilovoltage
L		Level (Brightness)
LCD		Liquid Crystal Display
LED		Light Emitting Diode
LIH		Last Image Hold
MC		Motion Correction
mA		MilliAmps

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Abbreviation		Definition
mm		Millimeters
MOD		Magneto Optical Drive
MTF		Modulation Transfer Function
mR		Milli–Rad
PACE		Post–Acquisition Copy & Enhance
PC		Personal Computer
P/N		Part Number
RAM		Random Access Memory
RF		Radiation/Fluoroscopy
S/N:		Serial #
REV		Reverse
RMS		Root–Mean–Squared
ROI		Region of Interest
UL		Underwriters Laboratories
uR		Micro–Rad
V Volts		
VCR		Video Casette Recorder
W		Window (Contrast)

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APPENDIX D
MODES OF OPERATION

The P500D has 4 operating modes:

- Fluoroscopy
- Pulsed Fluoroscopy
- Digital Subtraction Angiography (DSA)
- Radiography

The availability of a given mode depends on the selected protocol that is to be performed. That is, not all protocols have all modes available.

Protocols that require the acquisition of both Fluoro and Radiography images are divided into worksteps that determine the tube and mode to be used for each stage of the exam. The selection of each workstep automatically switches system to use the correct tube and mode.

The following sections describe each mode.

SECTION 1
FLUOROSCOPY MODE

1-1 Description

Fluoroscopy is an imaging technique commonly used by physicians to obtain real-time images of the internal structures of a patient through the use of a fluoroscope.

1-2 System controlled technique factors

- Fixed or Automatically Selected Technique Factors: The AutoEx feature automatically adjusts focal spot, dose rate and spectral filter to maintain constant brightness for a given patient thickness.
- How automatic adjustment is controlled: Controlled by an exposure “trajectory” calculated by the system per patient, per body part.

1-3 How to engage/ disengage

Fluoroscopy mode is engaged by selecting “Digital” on the IDD or IUI interface screen.

IDD

IUI

Press ‘Digital’ on the IDD to select digital mode of operation. If pulsed fluoro option is available, pressing will toggle between fluoro modes. Selecting Digital de-activates the other mode elections.

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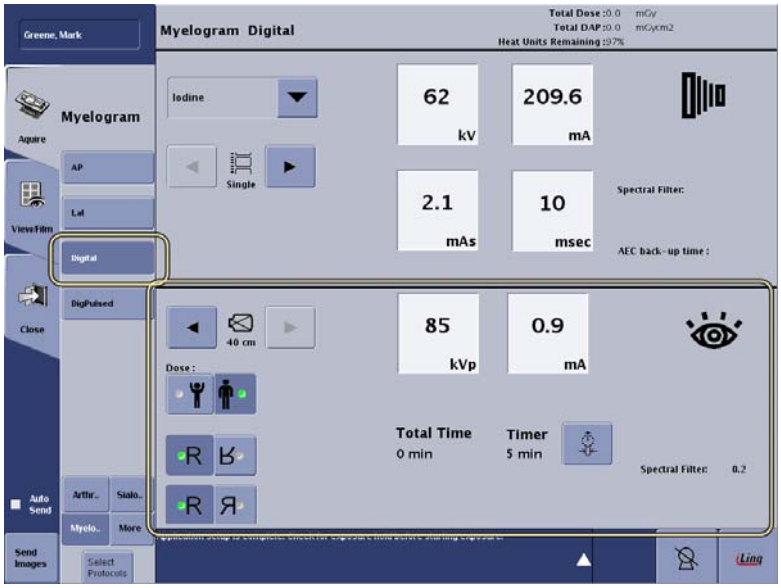
1-4 How to recognize when this mode is selected

When Flouroscopy mode is selected:

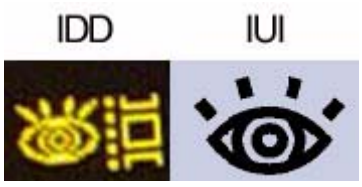
- X-ray tube 1 is selected (under table x-ray tube)
- The IDD console appears as follows

- The IUI screen will display record factors as well as fluoro factors. (The lower portion of the screen is dedicated to fluoro factors.)



- The “Digital” button on the IUI will be selected.

- Any mode that uses the Flouroscopy tube (tube 1) will display the fluoro “eye” icon on both the IUI and IDD wnen selected/engaged:



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1-5 Example of specific clinical procedures

The Fluoroscopy mode is designed to be used for the following types of radiological examinations:

- Upper Gastro–intestinal
- Barium Enema
- Pharynx/Esophogus
- Myelography
- General Fluoroscopy
- Retrograde Pyelography
- Cholangio/Panc.
- Urethro/Cysto.
- Venography – extremities
- Venography – other
- Cholecystography
- Arthrography
- Hysterosalpingography/Pelvimetry
- Interventional Biliary/Gastro–intestinal
- Interventional Urinary Tract
- Drainage Catheter Placement
- Diskography
- Lymphangiography

1-6 How mode should be used

Used by or under the direction of a physician specializing in diagnostic imaging.

SECTION 2
PULSED FLUOROSCOPY MODE

2-1 Description

Standard Fluoroscopy emits radiation continuously for the duration of the acquisition. Pulsed Fluoroscopy reduces the patient's dose by emitting radiation in short bursts.

2-2 System Controlled Technique Factors

- Fixed or Automatically Selected Technique Factors: Pulse rates are variable from 15fps/7.4fps/4fps.
- How automatic adjustment is controlled: Controlled by an exposure "trajectory" calculated by the system per patient, per body part.

2-3 How to engage/ disengage

If available, this mode is engaged by selecting "Dig Pulsed" on the IUI interface screen.

If pulsed fluoro option is available, pressing "Digital" on the IDD will toggle between fluoro modes. Selecting Digital de-activates the other mode elections.

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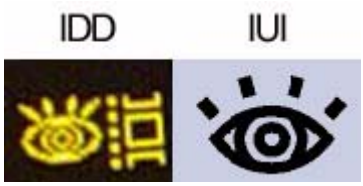
2-4 How to recognize when this mode is selected

- The "Dig Pulsed" button on the IUI interface screen will be selected when this mode is engaged.

- Any mode that uses the Flouroscopy tube (tube 2) will display the fluoro "eye" icon on both the IUI and IDD when selected/engaged:



2-5 Example of specific clinical procedures

Pulsed fluoro is used as a dose reduction feature and is helpful in longer studies in which dose savings is desired, as well as pediatric applications.

2-6 How mode should be used

Used by or under the direction of a physician specializing in diagnostic imaging.

SECTION 3
DIGITAL SUBTRACTION ANGIOGRAPHY (DSA) MODE

3-1 Description

This mode is a purchasable option.

Digital Subtraction Angiography (DSA) is the procedure to visualize blood vessels with contrast medium in a bony environment by subtracting the pre-contrast image (the mask) from the image with contrast medium.

3-2 System Controlled Technique Factors

- Fixed or Automatically Selected Technique Factors: Allows for the subtraction of images frames resulting in the frames difference being displayed.
- How automatic adjustment is controlled: A calibrated ion chamber controls the duration of the exposure time for each frame.

3-3 How to engage/ disengage

This mode is engaged by selecting a DSA protocol on the IUI interface screen.

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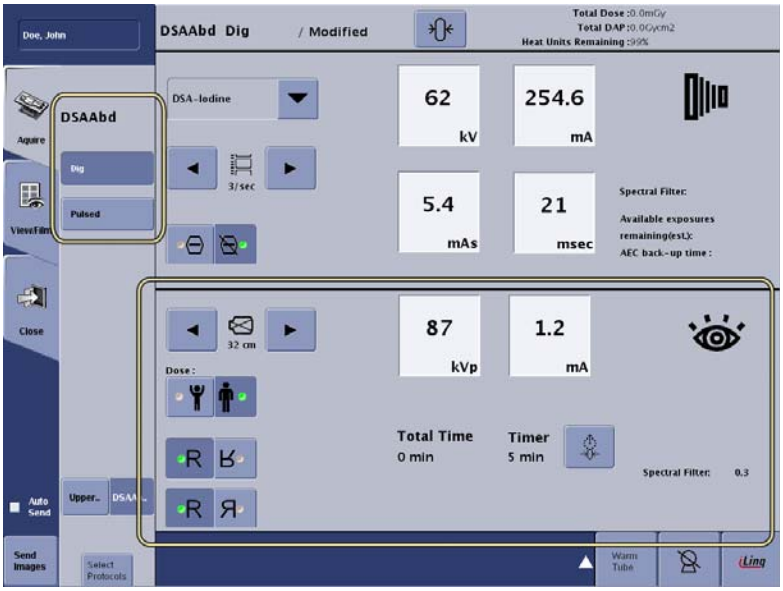
3-4 How to recognize when this mode is selected

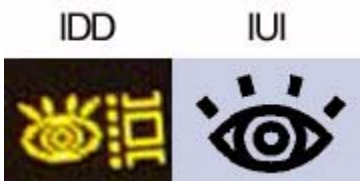
When this mode is engaged:

- The IDD console appears as follows

- The IUI screen will display record factors as well as fluoro factors. (The lower portion of the screen is dedicated to fluoro/DSA factors.)



- Any mode that uses the Flouroscopy tube (tube 2) will display the fluoro “eye” icon on both the IUI and IDD when selected/engaged:



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3-5 Example of specific clinical procedures

Primarily used for contrast filled vessels.

DSA, an electronic technique for imaging blood vessels, is useful in diagnosing arterial occlusion, including carotid artery stenosis and pulmonary artery thrombosis, and in detecting renal vascular disease. After contrast material is injected into an artery or vein, a physician produces images that show the difference between the contrast-filled vessels and surrounding anatomy through an image subtraction process.

3-6 How mode should be used

Used by or under the direction of a physician specializing in diagnostic imaging.

SECTION 4
RADIOGRAPHIC MODE

4-1 Description

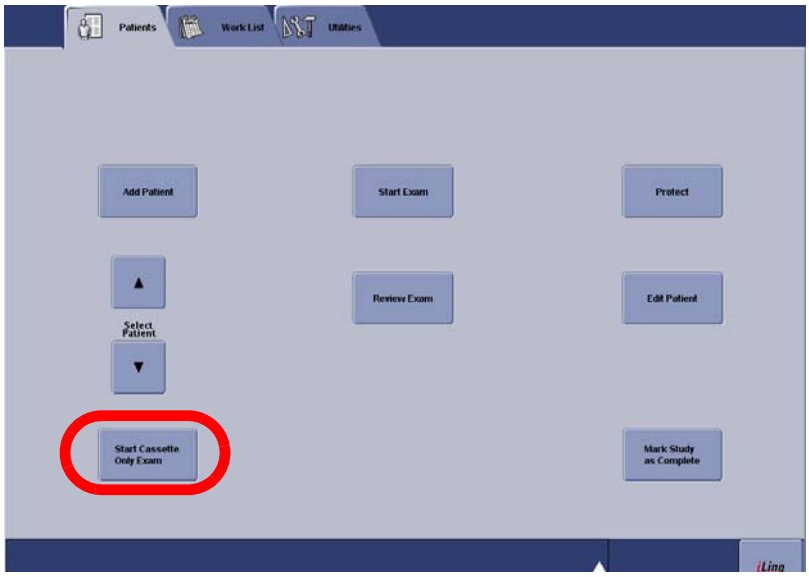
Standard x-ray exam using a cassette.

4-2 System Controlled Technique Factors

- Fixed or Automatically Selected Technique Factors: Fixed technique parameters include: kV, mA, ms, focal spot size. In the automatic exposure control (AEC) mode, the exposure time is determined when a pre-set density has been reached during exposure.
- How automatic adjustment is controlled: A calibrated ion chamber controls the duration of the exposure time.

4-3 How to engage/ disengage

The mode is engaged by pressing the “Start Cassette Only Exam” button on the IUI interface screen.



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4-4 How to recognize when this mode is selected

For radiography examinations, x-ray tube 2 is selected (over table x-ray tube). The Overhead Tube Suspension (OTS) user interface displays the following typical information:

4-5 Example of specific clinical procedures

This mode is designed to be used to perform standard radiographic views and procedures on the table top, table bucky or wall stand (if available).

4-6 How mode should be used

Used by or under the direction of a physician specializing in diagnostic imaging.

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